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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM AREA OF CONCERN 619 (AOC 619) SOLID WASTE MANAGEMENT UNIT 4 (SWMU 4) ZONE F TRANSMITTAL LETTER CNC CHARLESTON SC

8/28/2001

CH2M HILL

RFI REPORT ADDENDUM

Area of Concern 619/SWMU 4, Zone F

Charleston Naval Complex
North Charleston, South Carolina

SUBMITTED TO
U.S. Navy Southern Division
Naval Facilities Engineering Command

CH2M-Jones

June 2001

Revision 0
Contract N62467-99-C-0960

CH2M HILL
3011 S W Williston Road
Gainesville, FL
32608-3928
Mailing address:
P.O Box 147009
Gainesville, FL
32614-7009
Tel 352.335.7991
Fax 352.335.2959

CH2MHILL

August 28, 2001

Mr. David Scaturo
Division of Hazardous and Infectious Wastes
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum (Revision 1) – AOC 619/SWMU 4, Zone F

Dear Mr. Scaturo:

Enclosed please find four sets of replacement pages which serve as Revision 1 of the RFI Report Addendum for AOC 619/SWMU 4 in Zone F of the Charleston Naval Complex (CNC). Below is a summary of the material enclosed with this letter:

- Revision pages 1-1 and 4-1, to be replaced in the Revision 0 RFI Report Addendum for AOC 619/SWMU 4, Zone F, submitted by CH2M-Jones in June 2001.
- CH2M-Jones responses to comments concerning the Revision 0 RFI Report Addendum for AOC 619/SWMU 4, Zone F, submitted by CH2M-Jones in June 2001, and dated August 17, 2001.

Revision pages 1-1 and 4-1 have been amended to address the comments provided to CH2M-Jones concerning the Revision 0 RFI Report Addendum for AOC 619/SWMU 4, Zone F. This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Louise Palmer. Please contact her at 704/329-0072 if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

Mansour Malik Comments

No comments.

Jamelle Ellis Comments

1. Section 1.0, Figure 1-2 and Section 2.0, Figure 2-1
Two elongated structures exist southeast of Building 1824. These structures are not currently addressed in the text of the above mentioned document. Per our conversation on 8/15/01, the structures are trailers used for some sort of temporary activity and were inadvertantly included in the GIS and on figures in the RFI Report Addendum. In order to clarify the administrative record, please include a statement in your Background section addressing the temporary status of these structures. The revision may be sent via e-mail or fax to 803-896-4002 to the attention of Jamelle H. Ellis.

CH2M-Jones Response 1:
A sentence will be inserted in Section 1.1 stating that the two structures shown southeast of Building 1824 are temporary structures and are currently not at the site. Replacement pages will be distributed to the project team.

2.) Section 4.1 Surface Soil p.4-1
Lines 12-13 state "...BEQs, iron and manganese concentrations do not exceed the range of background data from combined Zones F and G..." The Department assumes that these constituents were actually screened against two different sets of background data, one for inorganics and the other for PAHs. In order to clarify the administrative record, please reference individual background data sets for like constituents separately. The revision may be sent via e-mail or fax to 803-896-4002 to the attention of Jamelle H. Ellis.

CH2M-Jones Response 2:
The referenced sentence will be revised into two sentences as requested. Replacement pages will be distributed to the project team.

CH2MHILL TRANSMITTAL

To: CNC Submittals Distribution List Recipients

From: Sara Vivas

Date: June 20, 2001

Re: RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC, Revision 0 (June 2001)

We Are Sending You:

Attached	Under separate cover via	
Shop Drawings	**Documents**	Tracings
Prints	Specifications	Catalogs
Copy of letter	Other:	

Description
Enclosed please find additional pages that should be inserted at the end of Appendix E material (*Responses to SCDHEC Comments*) for the RFI Report Addendum for AOC 619/SWMU 4 in Zone F of the CNC.

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Louise Palmer

Response to Reply to Comment Responses on the Draft Final Zone F RFI Report
June 25, 1999
clarifications inserted May 4, 2001 for AOC 619 RFI Addendum

SCDHEC (Eric Cathcart) Reply to Comments received 7 April 1999 on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) Charleston Naval Complex

SCDHEC Comment 1: Soil sample blanks for the following areas contained detectable contaminants: SWMU 4, AOC 619, SWMU 36, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 611, AOC 613, AOC 616, AOC 617, and Grid soil samples. Groundwater blanks contained detectable contaminants for the following areas: AOC 619, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 613, GEL samples, Location 240, AOC 617, and Grid groundwater samples. These detections were noted in the volatile, semivolatile, and metals methods. In accordance with the Environmental Protection Agency, *Standard Operating Procedures* for sample collection, trace contaminants in field, trip, equipment, and distilled water blanks may indicate a problem with either decontamination procedures and/or cross contamination of samples during collection or transport. The RFI report should fully explain the existence of trace contaminants in blanks. Please revise the text to include this/these explanation(s).

EnSafe Response 1: The Project Chemist has reviewed and evaluated the data and compiled the findings in the following memo to the Project Team for review and approval.

Memorandum

To: Charleston Naval Complex Project Team

From: Charlie Vernoy, EnSafe

Subject: **Response to Comments on the Draft Zone F and K RFI Reports**

Date: March 31, 1999

Contents of the memorandum not included. Refer to original comment letter.

SCDHEC reply:

The presence of tetrachloroethene in the field and method blanks for groundwater samples and the Navy's suggestion that cross contamination may have occurred between samples for

AOC 607 concerns the Department. The Navy should make every effort to prevent cross contamination in future samples. Field personnel should review the procedures for sample collection and shipment as noted in CVA Final Comprehensive Sampling and Analysis Plan dated 30 August 1994 and the EPA Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual.

The Navy's explanation for the high incident of metals in the field blanks should be validated through water quality data from the North Charleston Water System. The data report should be submitted within ninety days of receipt of this letter.

Ensafe Response:
EnSafe will contact the City of North Charleston to inquire if such data is available and, if so, obtain a copy for comparison to the metals detected in Zone F field blanks.

CH2M-Jones Response Clarification: *Data from the City for the time period during described sampling is not available for comparison.*

SCDHEC (Johnny Tapia) Reply to Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) Charleston Naval Complex

SCDHEC Comment 4:
The second paragraph of page 6.16 needs to be revised for the statements made about the use of the highest of background values (upper or lower soil) used as the screening alternative to SSLs. The same approach is mentioned for groundwater where the greater of shallow or deep background concentrations is used as an screening alternative to the tap water RBCs. Using this approach defeats the purpose of collecting two set of samples (upper and lower) to determine background reference concentrations and is not a conservative screening process. In addition, the same paragraph states that this approach is proposed based only on assumptions. The Screening process should continue as previously approved. Please revise this paragraph and consider implications throughout the report.

EnSafe revised Response 4:

The text will be modified to clarify that only SSLs will be used for the initial fate and transport screening. Inorganic SSL exceedances will be compared to background concentrations for discussion purposes only. Because the migration path, soil-to-groundwater, crosses through both soil intervals, the greater background will be used for this comparison.

As stated in the paragraph in question on page 6.16, the lithology of the surficial aquifer in Zone F is complex. Given the uncertainty about the interconnectedness of the portions of the aquifer encountered in each well, groundwater results from each depth (shallow or deep) will be screened only against background reference values from the corresponding depth for the final report.

SCDHEC Comment 6:
Page 7.10, "Summary of COPCs" paragraph makes the statement that "If no groundwater impacts were identified, the current soil concentrations were considered sufficiently protective of the underlying aquifer". The Department does not necessarily agree with this statement. Other factors as age of the unit, age of spills, type of contaminants present, barriers present (asphalt, concrete, etc.) would influence the presence of contaminants in groundwater. Please modify this statement and consider this factor when making this statement in reference to a specific unit.

EnSafe revised Response 6:
The Navy agrees and will revise the text in Section 7. Site specific factors potentially affecting the soil-to-groundwater pathway will be identified and discussed as appropriate for the site. This information will be added to the fate and transportation subsections of Section 10 text.

CH2M-Jones Response Clarification: *CH2M HILL is screening soil parameters for COPCs*

using the soil screening process as agreed upon with DHEC.

SCDHEC Comment 10:
There are two defined areas where subsurface samples were not collected. These areas are: One encompassing soil samples 619SB0011 and 619SB008. The other area encompasses soil borings 5, 6, 2, and 7 for AOC 619. Nearby detections of contaminants suggest that the extent has not been defined for VOCs, metals and SVOCs. Detections of VOCs and BEQs seem to coincide. The extent of this contamination should be defined.

EnSafe revised Response 10:
Subsurface soil samples were not collected from these locations due to the shallow watertable. A comparison of the soil constituents (benzo(a)pyrene, benzene, chromium, and thallium) which exceed the generic SSLs to analytes detected in shallow groundwater from nearby monitoring wells illustrates that these analytes do not appear to have impacted groundwater quality. To test this, The Navy proposes to perform a synthetic process leaching procedure (SPLP) analysis. This test will determine empirically the concentrations of these analytes that could be expected to leach from site soil to groundwater.

CH2M-Jones Response Clarification: *An SPLP evaluation was performed to arrive at site-specific SSLs for comparison to site data and migration to groundwater potential.*

SCDHEC (Susan Byrd) Reply to Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) Charleston Naval Complex

SCDHEC Comment 1:
Section 6.2.1, Page 6.11, Line 20
The text states that the soil-to-groundwater migration pathway was assessed using generic SSLs that assume a DAF of 20, rather than site specific SSLs. A vague description was given for the justification of the DAF value used; however, a more thorough explanation as to why the DAF value of 20 was selected, including site specific parameters, should be discussed in this section. A table showing the comparative site specific values should be included.

EnSafe Response 1:
Because of the number of sites in each zone, fate and transport evaluation consists of a conservative, first-look screening followed by a more detailed look at the potential problem chemicals identified in the screening. In keeping with the preliminary nature of the screening, generic DAFs of 10 or 20 have been used to calculate SSLs for protection of groundwater. Normally, a DAF of 20 is used, as recommended in the 1996 USEPA *Soil Screening Guidance*. Where hydrogeological conditions indicate that a more conservative value is appropriate, a DAF of 10 is used. For example, DAFs of 10 were used for the Naval Annex in Zone K because sediments there are almost entirely permeable sand, and for Zone I because groundwater levels are very close to the surface and the horizontal gradient is unusually low. Fate and transport evaluation for Zone E was carried out differently than for other zones: recognizing that groundwater would not be used as drinking water in this industrial area, the focus was on potential threats to surface water in the Cooper River. To make up for this less conservative approach to groundwater, the DAF was arbitrarily lowered from 20 to 10, although hydrogeological conditions would have justified using 20. The decision to use a DAF of 20 was not dependant on site specific parameters. The rationale for using a DAF of 20 for Zone G is presented in Section 6.3.

CH2M-Jones Response Clarification: *Site-specific DAFs have been calculated for each group of sites within Zone F. The site-specific DAF for AOC 619 was estimated at 24.8, under the assumption that all existing structures and pavement could be removed in the future, resulting in more infiltration than is currently occurring.*

SCDHEC Comment 6:
Section 10.1
It would be very helpful to have a map at the beginning of each SWMU and AOC section showing the location of each SWMU or AOC within Zone F. The maps provided in each section are larger scale maps of the SWMUs and AOCs which do not show their locations within the entire Zone.

EnSafe Response 6:
This information is provided as Figure1-2 in Volume I of the RFI.

CH2M-Jones Response Clarification: *A location map will be provided at the beginning of each AOC or SWMU section.*

SCDHEC Comment 7:
Section 10.1, Page 10.1.103, Line 14
The text states a range of 1E-06 to 1E-06. The text should be modified to reflect a range of 1E-04 to 1E-06.

EnSafe Response 7:
The text will be revised to rectify this error.

CH2M-Jones Response Clarification: *COCs have not been identified at AOC 619; this text does not appear in the RFI Addendum for SWMU 4/ AOC 619.*

SCDHEC Comment 8:
Section 10.1.110, Line 10
The text refers to a map of SWMU 109. The map identified is of SWMU 4 and AOC 619; therefore, the text should be modified to reflect the proper areas.

EnSafe Response 8:
The text will be revised to rectify this error.

CH2M-Jones Response Clarification: *The figure referenced is not applicable to and will not be presented in the RFI Addendum; the Revision 0 text will not be modified.*

RFI REPORT ADDENDUM

Area of Concern 619/SWMU 4, Zone F

Charleston Naval Complex
North Charleston, South Carolina

SUBMITTED TO
U.S. Navy Southern Division
Naval Facilities Engineering Command

PREPARED BY
CH2M-Jones

June 2001

Revision 0
Contract N62467-99-C-0960
158814.ZF.PR.06

Certification Page for RFI Report Addendum (Revision 0)– AOC 619/SWMU 4, Zone F

I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

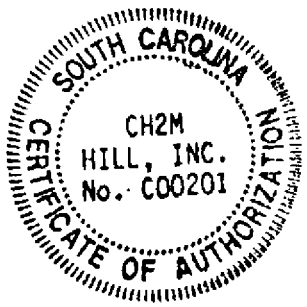
South Carolina

Temporary Permit No. T2000342

Dean Williamson, P.E.

6/15/2001

Date



Contents

Appendices

Acronyms and Abbreviations

AOC	area of concern
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BEQ	benzo(a)pyrene equivalent
BRAC	Base Realignment and Closure Act
BRC	background reference concentration
CA	corrective action
CMS	corrective measures study
CNC	Charleston Naval Complex
COC	chemical of concern
COPC	chemical of potential concern
DAF	dilution attenuation factor
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
FDS	fuel distribution system
ft^2	square feet
HHRA	human health risk assessment
HI	hazard index
ILCR	Incremental Lifetime Cancer Risk
MCL	maximum contaminant level
MDL	method detection limit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NAVBASE	Naval Base
NFA	no further action
NFI	no further investigation
OP	organo-phosphorus
OWS	oil/water separator

1	PAH	polycyclic aromatic hydrocarbon
2	PCP	pentachlorophenol
3	RBC	risk-based concentration
4	RCRA	Resource Conservation and Recovery Act
5	RFA	RCRA Facility Assessment
6	RFI	RCRA Facility Investigation
7	SCDHEC	South Carolina Department of Health and Environmental Control
8	SPLP	synthetic precipitation leaching procedure
9	SSL	soil screening level
10	SVOC	semivolatile organic compound
11	SWMU	solid waste management unit
12	TCE	trichloroethylene
13	TPH	total petroleum hydrocarbon
14	UST	underground storage tank
15	VOC	volatile organic compound

SECTION 1.0

Introduction

1.0 Introduction

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates closure and transition of property to the community. The Charleston Naval Complex (CNC) was formed as a result of the dis-establishment of the Charleston Naval Shipyard and NAVBASE on April 1, 1996.

Corrective Action (CA) activities are being conducted under the Resource Conservation and Recovery Act (RCRA), with the South Carolina Department of Health and Environmental Control (SCDHEC) as the lead agency for CA activities at the CNC. All RCRA CA activities are performed in accordance with the Final Permit (Permit No. SC0 170 022 560).

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Solid Waste Management Unit (SWMU) 4 and Area of Concern (AOC) 619 in Zone F of the CNC. The site is recommended for No Further Action (NFA). Figure 1-1 illustrates the location of Zone F within the CNC. Figure 1-2 shows an aerial photograph of the AOC 619 and SWMU 4 areas.

1.1 Background

AOC 619 is the site of a former waste oil storage yard, which was active from 1955 to 1982. Historical records indicate that site activities included storage, transfer, and distribution of petroleum waste and/or fuel via subsurface conveyance piping and two 15,000-gallon aboveground storage tanks (ASTs). These tanks were constructed in 1964. Waste oil and sludge delivered to the site using rail cars was transferred into the tanks for temporary storage until 1980, at which time they were upgraded for gasoline storage, including installation of a concrete containment sump.

Two former buildings, Building 175 and Facility 3908, were demolished in 1986. There are no records of any spills or releases associated with historical activities at these buildings or at the site in general. AOC 619 was paved in 1980; approximately 80 percent of the site area is paved or under roof. The site is east of Hobson Avenue in an industrial area. The CNC Reuse Plan identifies this area for industrial land use. The City of North Charleston zoning for this site is M-2, or marine industrial. Existing buildings at the site are designated 1824, 1836, 1316, and 381, and are shown in Figure 1-2. Two temporary structures shown southeast of Building 1824 are not presently at AOC 619.

SWMU 4, located within the southwest corner of AOC 619, includes Buildings 1316 and 381. Building 1316 (500 square feet [ft²]) was constructed in 1944 and used for tool storage. Building 381 (2,000 ft²), was constructed in 1981. This building includes a pesticide formulation and mixing room and equipment wash area, as well as sink and floor drains, which are connected to the sanitary sewer system. Building 381 was used for pesticide storage until 1985, after which time the building was used for general storage.

Building 1824, located at the northeast corner of AOC 619, was constructed in 1990. This building, which comprises 17,800 ft², is used to temporarily store (less than 90 days) hazardous waste and features a loading dock on the south side. Building 1836, located immediately west of Building1824, was constructed in 1981 and includes 4,000 ft² of floor space. Building 1836 is used for general storage.

For the Zone F RFI, EnSafe Inc. (EnSafe) conducted a round of soil and sediment sampling, and four groundwater sampling events in 1996 and 1997. The findings were reported in the *Zone F RFI Report, Revision 0* (EnSafe, 1997); only the first three groundwater sampling events were included in the report. The report listed benzene, methylene chloride, trichloroethene, benzo(a)pyrene, manganese, chromium, and thallium in soil samples with concentrations above soil screening criteria. The report listed chloromethane and thallium as constituents with concentrations above groundwater screening criteria.

In addition to the AOC 619 sampling, investigations for Zones L (AOC 504 railroad lines and SWMU 37 sanitary sewers) and G, as well as the Fuel Distribution System (FDS), were conducted within or adjacent to the AOC 619 boundary, and soil sampling by borings and direct-push sampling methods was conducted. Groundwater sampling was performed using direct-push method as well. The results of those sampling efforts were not reported in the *Zone F RFI Report, Revision 0*, but were provided in the *Zone L RFI Report, Revision 0* (EnSafe, 1998).

Subsequent to issuing the *Zone F RFI Report, Revision 0*, EnSafe collected additional soil samples in the northern portion of AOC 619. These samples were collected as presented in the *Zone F RFI Work Plan Addendum, Revision 0* (EnSafe, 1999) to address data gaps associated with polycyclic aromatic hydrocarbons (PAHs) at the northern portion of the site. EnSafe also performed a synthetic precipitation leaching procedure (SPLP) evaluation, which included the installation of new borings at three locations that had previously been sampled during the 1996 investigation. The results of these subsequent investigations are presented in this RFI Report Addendum.

1.2 Purpose of the RFI Report Addendum

This report addendum provides information about AOC 619/ SWMU 4 that documents the conclusions from the *Zone F RFI Report, Revision 0*, and provides the results of related sampling within the AOC area and additional sampling performed after the report was completed. Conclusions regarding site closure are also presented.

The results of additional investigations are presented to complete the nature and extent investigation for chemicals of potential concern (COPCs) previously identified in surface soil, subsurface soil, and groundwater.

Prior to changing the status of any site in the CNC RCRA CA permit, the BRAC Cleanup Team (BCT) agreed that the following issues should be considered:

- Status of the RFI
- Presence of metals (inorganics) in groundwater
- Potential linkage to Solid Waste Management Unit (SWMU) 37, Investigated Sanitary Sewers at the CNC
- Potential linkage to AOC 699, Investigated Storm Sewers at the CNC
- Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
- Potential linkage to surface water bodies (Zone J)
- Potential contamination associated with oil/water separators (OWSs)
- Relevance or need for land use controls at the site

Information regarding these issues is provided in this RFI Report Addendum to expedite evaluation of closure of the sites.

Provided that the information presented in this report is adequate to address these site closeout items, it is expected that the BCT will concur that NFA is appropriate for the site. At that time, a Statement of Basis will be prepared that will be available for public comment in accordance with SCDHEC policy. This will allow for public participation in the final remedy selection.

1.3 Report Organization

This RFI Report Addendum consists of the following sections, including this introductory section:

1.0 Introduction—Presents the purpose of the report and background information relating to the RFI Report Addendum.

2.0 Summary of RFI Conclusions for SWMU 4/AOC 619—Summarizes the conclusions from the RFI investigations and risk evaluations for AOC 619/ SWMU 4 presented in the *Zone F RFI Report, Revision 0*.

3.0 Summary of Additional Investigations—Summarizes the information collected within the AOC site area for the Zones L and G investigations, and data collected after completion of the *Zone F RFI Report, Revision 0*.

4.0 COPC Refinement—Evaluates and identifies COPCs based on current screening criteria using all RFI data.

5.0 Summary of Closeout Issues—Discusses the various site closeout issues that the BCT agreed to evaluate prior to site closeout.

6.0 Recommendations—Provides recommendations for proceeding with site closure.

7.0 References—Lists the references used in this document.

Appendix A contains excerpts from the *Zone F RFI Report, Revision 0* (EnSafe, 1997).

Appendix B contains analytical data from additional investigations in the AOC 619/ SWMU 4 area.

Appendix C contains validation reports from data presented in this RFI Report Addendum.

Appendix D contains a summary of SSL Derivation Methodology, SSLs pertinent to AOC 619/ SWMU 4, and SPLP tests conducted at SWMU 4/AOC 619.

Appendix E contains responses to SCDEHC comments concerning the RFI report for AOC 619/ SWMU 4. The responses address these two sites only, comments for other sites addressed by the *Zone F RFI Report, Revision 0* are not included in this appendix.

All tables and figures appear at the end of their respective sections.

Figure 1-1
Zone F and AOC 619/SWMU 4
Location Map
Charleston Naval Complex

CH2MHILL

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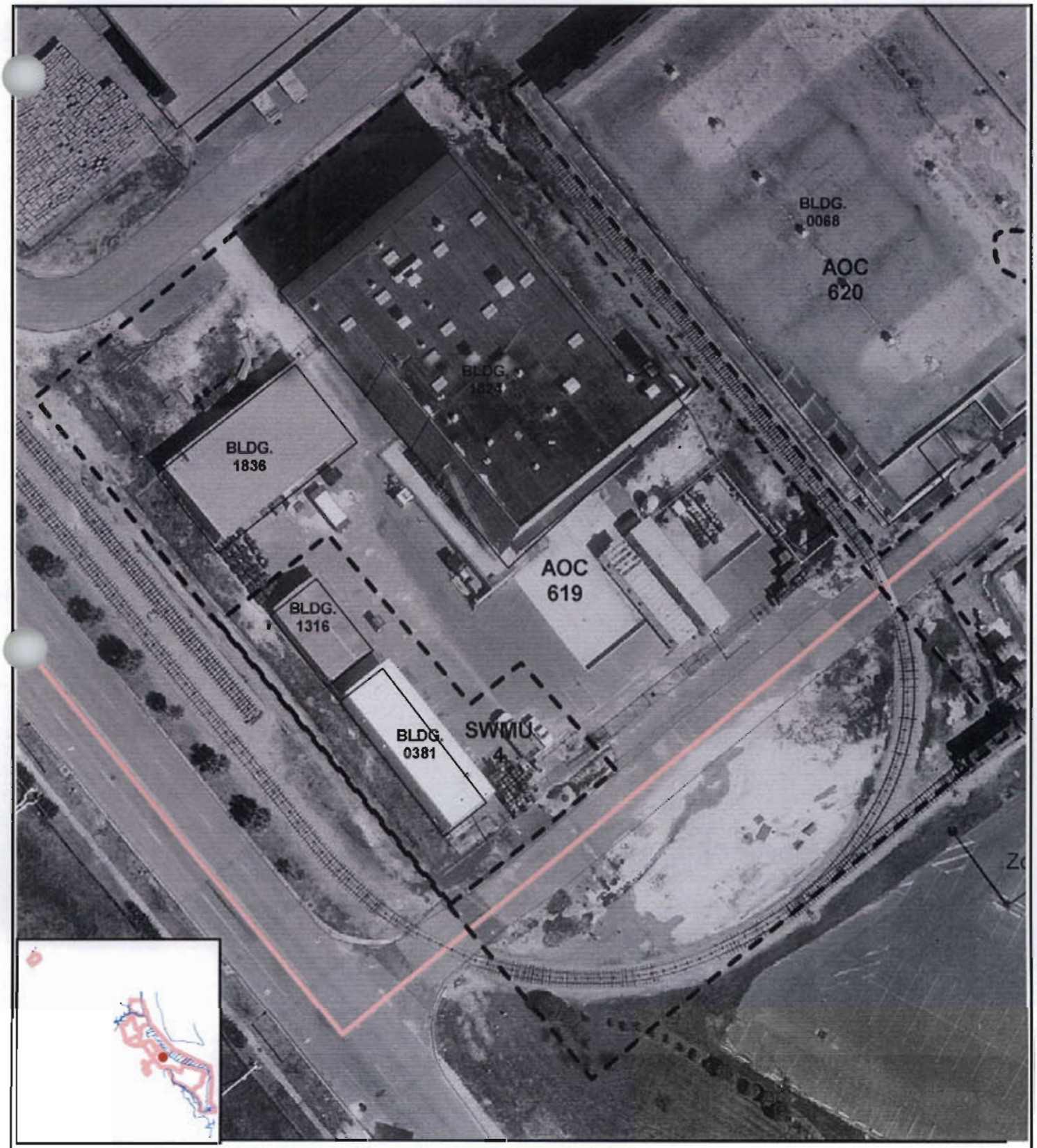

AOC/SWMU Boundary
Railroads
Zone Boundary

N

0 40 80 Feet

Figure 1-2
AOC 619/SWMU 4
Aerial Photo
Charleston Naval Complex

CH2MHILL

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SECTION 2.0

Summary of RFI Conclusions for AOC 619/SWMU 4

2.0 Summary of RFI Conclusions for AOC 619/SWMU 4

During the Zone F RFI, soil, sediment, and groundwater investigations were conducted in the area of the former oil storage yard (AOC 619) and the pesticide building (SWMU 4). Figure 2-1 presents the site and RFI sample locations within this area. Initially, 19 soil borings (F004SB001 through F004SB004; and F619SB001 through F619SB015) were advanced to collect both surface and subsurface soil samples. At six of the borings the groundwater was encountered within the subsurface soil sampling interval and the deeper samples were not collected. Sediment sample 619M0001 was collected from the base of a catch basin at the south-central section of the site. Groundwater samples were collected from four monitor wells (F619GW001, F619GW002, F619GW003, and F620GW001) for three quarters from 1996 to 1997. Results for samples from F620GW001 were reported in the *Zone F RFI Report, Revision 0* (EnSafe, 1997) in the section describing SWMU 36/AOC 620; the other groundwater well samples were discussed in the report section which describes AOC 619/SWMU 4.

The *Zone F RFI Report, Revision 0* presented the results of these tests and conclusions concerning contamination and human health risk. Five additional soil borings (F619SB016 through F619SB020) were advanced in 1999, subsequent to the RFI. These borings are discussed in Section 3.0 of this RFI Report Addendum. Conclusions from the *Zone F RFI Report, Revision 0* are summarized below. Excerpts from that report are presented in Appendix A.

2.1 Surface Soil and Sediment Results

Except for F619SB003, surface soil samples were analyzed for volatile organic compounds, (VOCs), semivolatile organic compounds (SVOCs), metals, and pesticides/polychlorinated biphenyls (PCBs), with selected samples also analyzed for cyanide, herbicides, and organophosphorous (OP) pesticides. The soil samples from F619SB003 were analyzed for pesticides and OP pesticides only. Field duplicate samples were analyzed for the Appendix IX list, which included hexavalent chromium and dioxins. The catch basin sediment sample was analyzed for VOCs, SVOCS, metals, cyanide, and pesticides/PCBs.

Data from surface soil samples were compared to the U.S. Environmental Protection Agency (EPA) Region III Risk-Based Concentrations (RBCs) for an unrestricted land use

scenario and SSLs. SSLs from Appendix A of the *EPA Soil Screening Guidance: Technical Background Document* (EPA, 1996) with dilution attenuation factor (DAF)=20 were used for SSL comparison. In addition, inorganic data were compared to background reference concentrations (BRCs).

Benzo(a)pyrene equivalents (BEQs), as high as 0.540 milligrams per kilogram (mg/kg), were identified in 13 out of 18 surface soil samples, each exceeding the residential RBC of 0.088 mg/kg. Pentachlorophenol (PCP) was identified at a concentration exceeding its SSL in a field duplicate sample from F619SB005; however, it was not detected in any other sample. Iron was detected above its residential RBC in 14 out of 18 surface soil samples; no BRC was provided. Manganese was detected above the BRC and residential RBC in one out of 18 surface soil samples (F619SB015). Several VOCs, pesticides, and PCBs were detected in site soils, all at concentrations below their respective residential RBCs and SSLs. Tables showing the site's detected constituents, and which were reported in the *Zone F RFI Report, Revision 0* are presented in Appendix A.

Trichloroethylene (TCE) was detected in the sediment sample at 4 micrograms per kilogram (µg/kg); however, this sample (619M0001) was collected from an engineered structure, and therefore was not compared to reference concentrations or other criteria. It was similar in concentration to the levels of TCE detected in some subsurface soil samples throughout the AOC 619 area. TCE was detected at 2 µg/kg in surface soil, compared to an RBC of 58,000 µg/kg and SSL of 60 µg/kg. Other constituents identified in the sediment sample were within the range of detected concentrations in AOC 619 surface soils. The concentrations of all detected constituents in the sediment sample are presented in Appendix A.

2.2 Subsurface Soil Results

Subsurface soil was analyzed for the same parameters as the corresponding surface soil sample from the same boring location. Data from subsurface soil samples were compared to SSLs from Appendix A of the *EPA Soil Screening Guidance: Technical Background Document* with DAF=20. In addition, inorganic data were compared to BRCs.

Subsurface soil contained concentrations of benzene (at F619SB001), TCE (at F619SB001), and methylene chloride (at F619SB004) above their respective SSLs. Thallium was identified above its SSL at F619SB009; no BRC was provided. Total chromium was identified at four sample locations as high as 43.4 mg/kg , compared to a BRC of 32.2 mg/kg and SSL of 38 mg/kg (for Cr6).

All other VOCs, SVOCs, pesticides, PCBs, and metals were detected below SSLs or BRCs.

2.3 Groundwater Results

Groundwater was sampled for VOCs, SVOCs, metals, pesticides/PCBs, and OP pesticides. At F620GW001 the pesticides and OP pesticides were omitted. Data were compared to maximum contaminant levels (MCLs) and BRCs; for constituents with no MCLs, tap water RBCs were used.

Chloromethane and thallium were detected in groundwater above their respective MCLs, RBCs, or background levels. One detection of chloromethane from F619GW003 was estimated at 8 µg/kg, compared to the tap water RBC of 1.4 µg/kg. There were three BRC exceedances of thallium out of 12 samples from the four wells, each in a different well. Thallium was identified at 11.0 µg/L at F620GW001, compared to the BRC of 5.58 µg/L and MCL of 2 µg/L. Thallium was also detected at estimated concentrations as high as 6.8 µg/L within the first two sampling events. Iron was detected in all the wells at concentrations as high as 32,000 µg/L, compared to an MCL of 300 µg/L; no BRC was provided. Concentrations of constituents detected in groundwater during the first three RFI sampling events are presented in Appendix A.

2.4 Human Health Risk Assessment

The fate and transport discussion in the *Zone F RFI Report, Revision 0* identified benzene, methylene chloride, and thallium as exceeding SSLs for the soil-to-groundwater migration pathway, based on a DAF of 20. However, the distribution of these compounds was described in the RFI report as "not laterally persistent," with a vertical distribution that "suggests an old release(s)....consistent with their adsorption and demobilization in surface soil horizons." It was further stated, "...the soil to groundwater pathway is not expected to result in significant risk to human health or the environment." For the groundwater-to-surface water pathway, only thallium was detected in groundwater slightly above the RBC. In regard to this pathway, the RFI report stated that, "...the clear lack of source attribution, the general low concentrations of exceedences, and the limited lateral presence of exceeding constituents provide that the groundwater migration pathway is insignificant at this site." Other migration pathways were also considered to be invalid.

The human health risk assessment (HHRA) section (10.1.7) of the RFI report concludes that BEQs and manganese were identified as COPCs in soil; iron was identified as an essential nutrient and was not considered a COPC. Chloromethane and thallium were identified as COPCs in groundwater.

For the soil pathways, the residential exposure scenario resulted in a calculated Incremental Lifetime Cancer Risk (ILCR) within the acceptable range of 10^{-6} to 10^{-4}, and a hazard index (HI) of less than 1.0 In addition, for the industrial (site worker) scenario, the ILCR is less than 10^{-6} and the HI is less than 1.0. For the groundwater pathway, the ILCR is within the range of 10^{-6} to 10^{-4}, and the HI is greater than 1 for the resident. For the worker scenario, the ILCR is less than 10^{-6} and the HI is less than 1.

2.5 Conclusions and Recommendations

The RFI concluded that a corrective measures study (CMS) should be conducted for the surface soil and groundwater. Surface soil COCs for unrestricted land use were identified as manganese and BEQs. The groundwater COCs were thallium and chloromethane, on the basis of the risk under an unrestricted land use scenario.

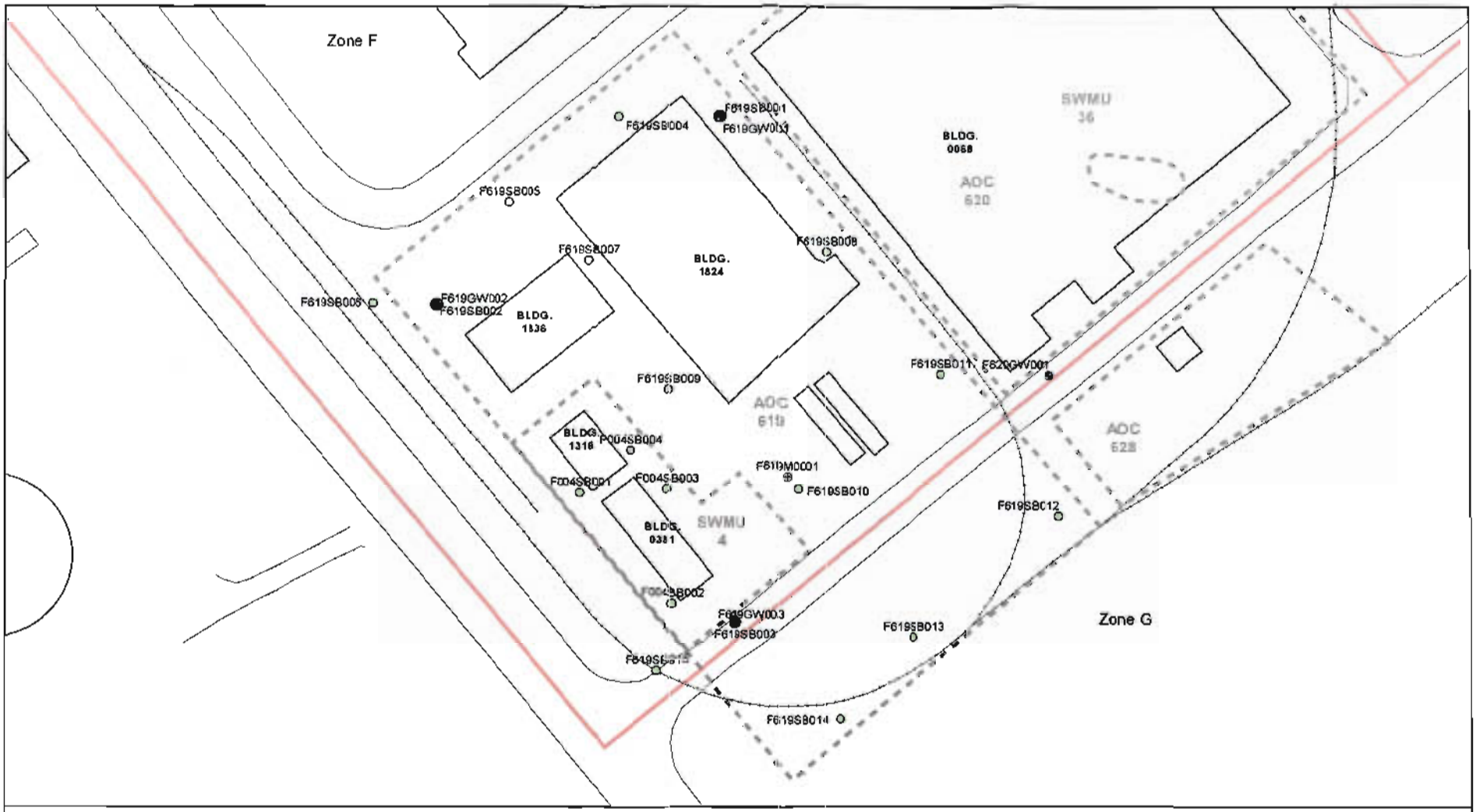


Figure 2-1
AOC 619/ SWMU 4
Originally Reported RFI Sample Locations
Charleston Naval Complex

CH2MHILL

SECTION 3.0

Summary of Additional Investigations

3.0 Summary of Additional Investigations

This section summarizes site activities conducted subsequent to the *Zone F RFI Report, Revision 0* (EnSafe, 1997), and provides interpretation of analytical data associated with these activities. The results from the first three quarters of groundwater sampling were reported in the *Zone F RFI Report, Revision 0* as described in Section 2.0 of this RFI Report Addendum. The fourth quarter of data is described in this section. This section also includes a review of analytical data associated with soil and groundwater samples procured from various utility corridors located in the immediate vicinity of the site, designated "FDS" (Fuel Distribution System) and "L" (Zone L/F Utility/Railway Corridor). Sample locations described in this section are shown in Figure 3-1.

During 1999, additional field activities were conducted subsequent to the *Zone F RFI Report, Revision 0*. New soil borings were advanced and soil samples were collected at the north portion of the site, as shown in Figure 3-1. In addition, select boring locations from the RFI were re-sampled (i.e., a new boring was installed in the immediate vicinity of the original location and new samples were collected) for the purpose of conducting an SPLP evaluation.

Analytical data and validation reports for the fourth groundwater sampling event, the 1999 soil investigation activity, and the FDS samples located within the AOC are summarized in Appendices B and C, respectively. Data summaries and data validation reports from the Zone L activities within the AOC were previously presented to SCDHEC in the *Zone L RFI Report, Revision 0* (EnSafe, 1998). From the SPLP results, site-specific SSL values were calculated to evaluate the soil-to-groundwater migration pathway. The methodology used to calculate site-specific SSLs is documented in Appendix D.

3.1 Soil Sampling and Analysis

Five additional soil borings (F619SB016 through F619SB020) were installed at the north side of Building 1824 to evaluate BEQs in this area. Each boring included surface and subsurface sampling. All samples were analyzed for SVOCs only. On the basis of these samples, BEQ impacts were considered to be delineated.

Three soil boring locations (F619SB001, F619SB004, and F619SB015) were re-sampled for VOCs, SVOCs, pesticides, PCBs, and metals. SPLP analyses were performed for each sample/target analytical parameter. SPLP results are summarized in Appendix D of this

RFI Report Addendum. SSLs for inorganic analytes, except thallium, were developed from SPLP data. SSLs for thallium, organics, and pesticides/PCBs were developed from the October 2000 EPA Region III RBC tables and adjusted for the site-specific DAF of 24.8.

Although the *Zone L RFI Report, Revision 0* described soil borings LF504SB001 and LF504SB003, these samples were located at the boundary of AOC 619 and are also included as supporting data in this RFI Report Addendum. These samples were analyzed for VOCs, SVOCs, metals, pesticides, herbicides, and PCBs. In addition, Zone L soil probe samples LG037SP001, LF037SP028, and LF037SP029 were collected within the AOC 619 area and analyzed for VOCs and metals. FDS samples GFDSSC036, GFDSSC037, and GFDSSC054 were collected in the AOC 619 area and analyzed for total petroleum hydrocarbons (TPHs).

All soil data were compared against the AOC 619 site-specific SSLs (using a DAF = 24.8 as calculated by CH2M-Jones). Surface soil data were also compared against the October 2000 EPA Region III residential and industrial RBCs (1/10 of the RBC was used for non-carcinogenic compounds). Inorganics in both surface and subsurface soil were also compared against the Zones F and G combined background (grid-based) range values. Because the Zone F grid-based sample population is fewer than 10, Zones F and G background data were combined in order to screen against a greater population of data points. Inorganics that were detected in soil at concentrations within the Zone F or Zone G background grid-based ranges were eliminated from further consideration. BEQs were likewise screened against the background BEQ value (2 times adjusted mean) for surface or subsurface soils (1,304 and 1,400 µg/kg, respectively) as appropriate (CH2M-Jones, 2001).

Tables 3-1, 3-2, and 3-3, respectively, summarize organics, metals, and pesticides/PCBs detected in surface soil samples collected during 1999 investigation activities and during the Zone L and FDS activities. Tables 3-4 and 3-5 present organics and metals detected in subsurface soil. TPHs are also reported in Tables 3-1 and 3-4. As noted in these tables, surface soil samples with concentrations that exceeded the background range had concentrations less than both SSLs and residential RBCs. Likewise, subsurface soil samples with concentrations that exceeded the background range did not exceed SSLs. Therefore, no COPCs for surface or subsurface soil were identified from these sampling events.

3.2 Groundwater Sampling and Analysis

Tables 3-6 and 3-7 present organics and metals detected in groundwater from the fourth quarter sampling event at F619GW001, F619GW002, F619GW003, F620GW001, and the probe samples LG037GP002 and LF037GP044. Locations of wells and probe samples are

shown in Figure 3-1. Monitor well samples were analyzed for VOCs, SVOCS, metals, pesticides, and PCBs. Probe samples were analyzed for cyanide, metals, and VOCs. Metals analyses from probe samples are not considered representative of the groundwater because the method of sampling includes soil particulates from the surrounding formation. For that reason, metals data from direct-push groundwater samples are not meaningful and are not presented in Table 3-7. Tables 3-6 and 3-7 show all other detected constituents and compare them to BRCs and MCLs. If no MCLs are available, the data is compared to RBCs from the October 2000 EPA Region III tables.

As shown in Tables 3-6 and 3-7, no COPCs were identified in site groundwater.

TABLE 3-1
Organics Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC [b]	Region III Industrial Soil RBC [b]	Surface Background Reference Concentration
2-Methyl-naphthalene	LF504SB001	3.0	mg/kg	=	27.3	156	4,088	NA
	LF504SB003	2.2		=				
Ace-naphthene	LF504SB001	0.55	mg/kg	J	124	469	12,264	NA
	LF504SB003	0.36		J				
Acetone	F619SB001	0.016	mg/kg	=	3.1	782	20,440	NA
	F619SB015	0.009		=				
	LF037SP028	0.10		J				
	LF504SB003	0.46		=				
	LG037SP001	0.16		J				
Anthracene	LF504SB001	0.40	mg/kg	J	583	2,350	61,320	NA
	LF504SB003	0.22		J				
BEQs	F619SB017	0.32	mg/kg	=	NA	0.0875	0.78	1.304[c]
	LF504SB001	0.77		=				
	LF504SB003	1.04		=				
Benzo(a) Anthracene	F619SB017	0.10	mg/kg	J	1.86	0.875	7.84	0.616[c]
	LF504SB001	0.46		J				
	LF504SB003	0.55		J				
Benzo(a) Pyrene	F619SB017	0.09	mg/kg	J	0.459	0.0875	0.78	0.598[c]
	LF504SB001	0.30		J				
	LF504SB003	0.50		J				
Benzo(b) Fluoranthene	F619SB017	0.13	mg/kg	J	5.58	0.875	7.84	0.608[c]
	LF504SB003	0.52		J				
Benzo(g,h,i) Perylene	LF504SB001	0.36	mg/kg	J	NL	NL	NL	NA
	LF504SB003	0.45		J				
Benzo(k) Fluoranthene	F619SB017	0.083	mg/kg	J	60.8	8.75	78.4	0.596[c]
	LF504SB003	0.47		J				
Bis(2-Ethylhexyl) Phthalate	F619SB017	0.23	mg/kg	J	3,600	45.6	410	NA
Carbon Disulfide	F619SB015	0.0030	mg/kg	J	23.6	782	20,440	NA
	LF037SP028	0.020		=				

TABLE 3-1
Organics Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC [b]	Region III Industrial Soil RBC [b]	Surface Background Reference Concentration
Chrysene	F619SB017	0.13	mg/kg	J	186	87.5	784	0.620[c]
	LF504SB001	0.91		=				
	LF504SB003	0.76		J				
Fluoranthene	F619SB017	0.15	mg/kg	J	7,810	313	8,176	NA
	LF504SB001	0.56		J				
	LF504SB003	0.54		J				
Fluorene	LF504SB001	1.0	mg/kg	=	174	313	8,176	NA
	LF504SB003	0.55		J				
Gasoline Range Organics	GFDSSC037	0.024	mg/kg	=	NL	NL	NA	NA
	GFDSSC054	0.017		=				
Indeno(1,2,3-c,d)Pyrene	LF504SB001	0.11	mg/kg	J	16.1	0.875	7.84	0.525[c]
	LF504SB003	0.24		J				
Methyl Ethyl Ketone	LF037SP028	0.032	mg/kg	=	9.8	4,690	122,640	NA
	LF504SB003	0.13		=				
Naphthalene	LF504SB001	0.15	mg/kg	J	0 186	156	4,088	NA
	LF504SB003	0.18		J				
Phen-anthrene	F619SB017	0.12	mg/kg	J	NL	NL	NL	0.201
	LF504SB001	2.4		=				
	LF504SB003	1.4		=				
Pyrene	F619SB001	0 10	mg/kg	J	843	235	6,132	0.216
	F619SB015	0.08		J				
	F619SB017	0.14		J				
	LF504SB001	2.4		=				
	LF504SB003	1.1		=				
Toluene	LF504SB003	0 0020	mg/kg	J	10.9	1,560	40,880	NA
	LG037SP001	0.18		=				

[a] Generic soil-to-groundwater SSLs (DAF = 24.8) are from EPA Region III RBC table (October, 2000).

[b] Residential and industrial RBCs obtained from the EPA Region III, RBC Table (October, 2000). HI=0.1 is used for non carcinogenic compounds, HI=1.0 is used for carcinogenic compounds.

[c] Sitewide background concentration for surface soil taken from *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values (CH2M-Jones, 2001).*

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

TABLE 3-1
Organics Detected in Surface Soil
RFI Addendum, SWMU 4/AOC 619, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC [b]	Region III Industrial Soil RBC [b]	Surface Background Reference Concentration

NA Not available
NL Not listed

TABLE 3-2
Metals Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
Aluminum	F619SB001	9,100	mg/kg	=	3,690,000	7,821	204,400	2190 to 19,400
	F619SB004	5,200		=				
	F619SB015	6,700		=				
	LF037SP028	15,200		=				
	LF037SP029	7,060		=				
	LF504SB001	1,900		=				
	LF504SB003	9,080		=				
	LG037SP001	12,100		=				
Antimony	F619SB001	0.55	mg/kg	J	22	3.129	81.76	0.50 to 5.9
	F619SB004	0.50		J				
	F619SB015	0.70		J				
	LF504SB001	1.9		J				
	LF504SB003	1.4		J				
Arsenic	F619SB001	9.6	mg/kg	J	2,010	0.4258	3.82	3.0 to 30
	F619SB004	2.3		J				
	F619SB015	5.3		J				
	LF037SP028	10.1		=				
	LF037SP029	17.8		=				
	LF504SB001	3.4		=				
	LF504SB003	7.4		=				
	LG037SP001	11.7		=				
Barium	F619SB001	33.4	mg/kg	=	3,690	547.5	14,308	11 to 129
	F619SB004	16.3		J				
	F619SB015	23.4		=				
	LF037SP028	29.6		=				
	LF037SP029	28.1		=				
	LF504SB001	46.4		=				
	LF504SB003	29.7		=				
	LG037SP001	37.3		=				
Beryllium	F619SB001	0.36	mg/kg	J	44	15.64	409	0.19 to 1.3
	F619SB015	0.19		J				
	LF037SP028	0.91		=				
	LF037SP029	0.34		=				
	LG037SP001	0.72		=				
Cadmium	F619SB004	0.03	mg/kg	J	114	7.82	204	0.12 to 1.7
	F619SB015	0.15		J				
	LF504SB001	0.68		=				

TABLE 3-2
Metals Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
Cadmium	LF504SB003	0.18	mg/kg		114	7.82	204	0.12 to 1.7
	LG037SP001	0.67		=				
Calcium	F619SB001	5,010	mg/kg	J	NL	NL	NL	2080 to 52,300
	F619SB004	30,100		J				
	F619SB015	38,400		J				
	LF037SP028	11,400		=				
	LF037SP029	3,800		=				
	LF504SB001	3,460		=				
	LF504SB003	3,730		=				
	LG037SP001	16,800		=				
Chromium, Total	F619SB001	17.2	mg/kg	J	8,380	210[d]	450[d]	6.3 to 39
	F619SB004	11		J				
	F619SB015	18		J				
	LF037SP028	27.6		=				
	LF037SP029	26.2		=				
	LF504SB001	11.6		=				
	LF504SB003	22.6		=				
	LG037SP001	32.9		=				
Cobalt	F619SB001	3.5	mg/kg	J	318,000	469.3	12,264	0.94 to 36
	F619SB004	1.5		J				
	F619SB015	2.7		J				
	LF037SP028	4.48		=				
	LF037SP029	2.12		=				
	LF504SB001	1.8		J				
	LF504SB003	3.0		J				
	LG037SP001	3.98		=				
Copper	F619SB001	21.6	mg/kg	=	107,000	312.9	8,176	5.7 to 431
	F619SB004	11.2		=				
	F619SB015	45.4		=				
	LF037SP028	17.8		=				
	LF037SP029	32		=				
	LF504SB001	29.5		=				
	LF504SB003	23.6		=				
	LG037SP001	38.7		=				
Iron	F619SB001	11,900	mg/kg	=	1,270,000	2346	61,320	3570 to 32,700
	F619SB004	4,790		=				
	F619SB015	8,570		=				

TABLE 3-2
Metals Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC [b]	Region III Industrial Soil RBC [b]	Surface Background Concentration Range [c]
Iron	LF037SP028	20,100		=	1,270,000	2,346	61,320	3570 to 32,700
	LF037SP029	12,400		=				
	LF504SB001	6,130		=				
	LF504SB003	12,500		=				
	LG037SP001	17,100		=				
Lead	F619SB001	58.3	mg/kg	=	400[e]	400[e]	1,000	3.5 to 275
	F619SB004	17		=				
	F619SB015	56		=				
	LF037SP028	39		=				
	LF037SP029	385		=				
	LF504SB001	159		=				
	LF504SB003	66.8		=				
	LG037SP001	101		=				
Magnesium	F619SB001	1,230	mg/kg	J	NL	NL	NL	323 to 5,280
	F619SB004	915		J				
	F619SB015	1,270		J				
	LF037SP028	3,470		=				
	LF037SP029	935		=	NL	NL	NL	323 to 5,280
	LF504SB001	253		=				
	LF504SB003	1,260		=				
	LG037SP001	2,380		=				
Manganese	F619SB001	167	mg/kg	=	436,000	156.4	4,088	32 to 436
	F619SB004	83.3		=				
	F619SB015	110		=				
	LF037SP028	207		=				
	LF037SP029	111		=				
	LF504SB001	80.3		=				
	LF504SB003	106		=				
	LG037SP001	176		=				
Mercury	F619SB001	0.16	mg/kg	=	40	2.35 [d]	61.3 [d]	0.06 to 2.0
	F619SB004	0.05		=				
	F619SB015	0.09		=				
	LF037SP028	0.22		=				
	LF037SP029	0.20		=				
	LF504SB003	0.25		=				
	LG037SP001	0.31		=				

TABLE 3-2
Metals Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
Nickel	F619SB001	9.2	mg/kg	=	5,360	156.4	4,088	2.0 to 27
	F619SB004	4.5		=				
	F619SB015	8.3		=				
	LF037SP028	8.39		=				
	LF037SP029	5.98		=				
	LF504SB001	9.9		=				
	LF504SB003	9.1		=				
	LG037SP001	10		=				
Potassium	F619SB001	731	mg/kg	J	NL	NL	NL	202 to 1,730
	F619SB004	323		J				
	F619SB015	536		J				
	LF037SP028	1,760		=				
	LF037SP029	685		=				
	LF504SB001	132		J				
	LF504SB003	718		=				
	LG037SP001	1,140		=				
Selenium	F619SB001	1.3	mg/kg	=	17	39.10	1,022	0.44 to 1.4
	F619SB004	0.52		J				
	F619SB015	0.70		J				
	LF037SP028	0.97		=				
	LG037SP001	0.98		=				
Sodium	F619SB001	353	mg/kg	J	NL	NL	NL	226 to 1,150
	F619SB004	276		J				
	F619SB015	270		J				
	LF037SP028	2,150		=				
	LF037SP029	244		=				
	LF504SB001	175		J				
	LF504SB003	258		J				
	LG037SP001	664		=				
Thallium	LF504SB003	1.0	mg/kg	J	4.51[f]	0.548	14.31	0.12 to 2.8[g]
Tin	F619SB001	6.0	mg/kg	J	NA	4,693	122,640	2.6 to 26
	F619SB004	4.5		J				
	F619SB015	17.2		=				
	LF504SB001	2.6		J				

TABLE 3-2
Metals Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
Vanadium	F619SB001	22.4	mg/kg	=	12,400	54.75	1,430.8	6.8 to 60
	F619SB004	9.4		=				
	F619SB015	14.2		=				
	LF037SP028	43.1		=				
	LF037SP029	21		=				
	LF504SB001	17.3		=				
	LF504SB003	27.9		=				
	LG037SP001	35		=				
Zinc	F619SB001	82.9	mg/kg	J	27,800	2,346	61,320	18 to 1,650
	F619SB004	98.7		J				
	F619SB015	128		J				
	LF037SP028	74.7		=				
	LF037SP029	149		=				
	LF504SB001	232		=				
	LF504SB003	99.3		=				
	LG037SP001	222		=				

[a] Zone F SSL Calculations -- AOC 619/SWMU 4 & AOC 620/SWMU 36

[b] Residential and industrial RBCs obtained from the EPA Region III, RBC Table (October, 2000). HI=0.1 is used for non carcinogenic compounds, HI=1.0 is used for carcinogenic compounds.

[c] Surface soil background range values are the minimum and maximum concentrations detected in Zones F and G combined grid samples.

[d] RBCs for Chromium and Mercury obtained from EPA Region 9 PRG Table (November, 2000). HI=0.1 is used for non carcinogenic compounds, HI=1.0 is used for carcinogenic compounds.

[e] Default lead RBC and SSL = 400 mg/kg

[f] Region III SSL for DAF = 24.8 for thallium

[g] Surface soil background range for thallium for Zones A through I grid samples combined.

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

NA Not available

NL Not listed

TABLE 3-3
Pesticides and PCBs Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, Charleston Naval Complex

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC [b]	Region III Industrial Soil RBC [b]	Surface Background Reference Concentration
Alpha-Chlordane	F619SB015	0.0054	mg/kg	=	1 04	1.82	16.4	NA
Endrin	LF504SB001	0.0030	mg/kg	J	6.7	2.35	61.3	NA
Endrin Aldehyde	LF504SB001	0.0052	mg/kg	J	NA	NA	NA	NA
Gamma-Chlordane	F619SB015 LF504SB001	0.012 0.0021	mg/kg	= J	1.04	1.82	16.4	NA
p,p'-DDD	LF504SB001 LF504SB003	0.058 0.0061	mg/kg	= J	13.6	2.66	23.8	NA
p,p'-DDE	F619SB015 LF504SB001	0.0062 0.0041	mg/kg	J =	43.4	1.88	16.8	NA
Arochlor-1260	F619SB015	0.11	mg/kg	=	NA	0.319	2.86	NA

[a] Generic soil-to-groundwater SSLs (DAF = 24.8) are from EPA Region III RBC table (October, 2000).

[b] Residential and industrial RBCs obtained from the EPA Region III RBC Table (October, 2000). HI=0.1 is used for non carcinogenic compounds, HI=1.0 is used for carcinogenic compounds.

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

NL Not listed

NA Not available

TABLE 3-4
Organics Detected in Subsurface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Surface Background Reference Concentration
Acetone	F619SB001	0.029	mg/kg	=	3.0	NA
	F619SB004	0.029		=		
	F619SB015	0.031		=		
BEQs	F619SB015	0.589	mg/kg	J	NA	1.400[b]
	F619SB016	0.393		J		
Benzo(a)Pyrene	F619SB016	0.100	mg/kg	J	0.47	0.623[b]
Benzo(b)Fluoranthene	F619SB016	0.096	mg/kg	J	5.7	0.631[b]
Benzo(k)Fluoranthene	F619SB016	0.120	mg/kg	J	57	0.609[b]
Benzoic Acid	F619SB019	0.100	mg/kg	J	NL	NA
Bis(2-Ethylhexyl) Phthalate	F619SB017	0.250	mg/kg	J	3500	NA
	F619SB020	0.260		J		
Carbon Disulfide	F619SB001	0.002	mg/kg	J	24	NA
	F619SB004	0.004		J		
Chrysene	F619SB015	0.110	mg/kg	J	180	0.616[b]
	F619SB016	0.120		J		
Fluoranthene	F619SB004	0.130	mg/kg	J	7700	NA
	F619SB015	0.130		J		
	F619SB016	0.150		J		
	F619SB019	0.150		J		
Gasoline Range Organics	GFDSSC036	0.0150	mg/kg	J	NL	NA
	GFDSSC037	0.0203		J		
Pyrene	F619SB004	0.160	mg/kg	J	840	NA
	F619SB015	0.150		J		
	F619SB016	0.140		J		
	F619SB019	0.190		J		
Toluene	F619SB004	0.002	mg/kg	J	11	NA

[a] Generic soil-to-groundwater SSLs (DAF = 24.8) are from EPA Region III RBC table (October, 2000).
[b] Sitewide background concentration for subsurface soil taken from *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values* (CH2M-Jones, 2001).

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

TABLE 3-4
Pesticides and PCBs Detected in Subsurface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

	Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Surface Background Reference Concentration
NA	Not available						
NL	Not listed						

TABLE 3-5
Metals Detected in Subsurface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Subsurface Background Concentration Range[b]
Aluminum	F619SB001	2,840	mg/kg	=	3,690,000	2630 to 36,800
	F619SB004	21,700		=		
	F619SB015	18,300		=		
Antimony	F619SB004	0.6	mg/kg	J	22	1.1 to 2.9
	F619SB015	1.0		J		
Arsenic	F619SB001	1.3	mg/kg	J	2,010	1.4 to 36
	F619SB004	17.7		J		
	F619SB015	10.6		J		
Barium	F619SB001	10.2	mg/kg	J	3,690	7.7 to 63
	F619SB004	157		=		
	F619SB015	30.8		=		
Beryllium	F619SB001	0.2	mg/kg	J	44	0.22 to 2.4
	F619SB004	1.4		=		
	F619SB015	0.7		=		
Calcium	F619SB001	490.0	mg/kg	J	NL	1040 to 127,000
	F619SB004	16,800		J		
	F619SB015	12,800		J		
Chromium, Total	F619SB001	4.5	mg/kg	J	8,380	7.4 to 65
	F619SB004	32.1		J		
	F619SB015	28.4		J		
Cobalt	F619SB001	0.8	mg/kg	J	318,000	0 90 to 15
	F619SB004	5.8		J		
	F619SB015	5.4		J		
Copper	F619SB001	1.4	mg/kg	J	107,000	2.5 to 55
	F619SB004	28.4		=		
	F619SB015	25 3		=		
Iron	F619SB001	2,330.0	mg/kg	=	1,270,000	3110 to 58,100
	F619SB004	26,100.0		=		
	F619SB015	18,900.0		=		
Lead	F619SB001	4.9	mg/kg	=	400[c]	2.4 to 123
	F619SB004	106.0		=		
	F619SB015	39.1		=		
Magnesium	F619SB001	248.0	mg/kg	J	NL	399 to 7,040
	F619SB004	3,790.0		J		
	F619SB015	2,620.0		J		

TABLE 3-5
Metals Detected in Subsurface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Subsurface Background Concentration Range [b]
Manganese	F619SB001	15.8	mg/kg	=	436,000	20 to 1,120
	F619SB004	722.0		=		
	F619SB015	236.0		=		
Mercury	F619SB004	0.6	mg/kg	=	40	0.04 to 0.57
	F619SB015	0.3		=		
Nickel	F619SB001	1.7	mg/kg	J	5360	1.9 to 22
	F619SB004	11.1		=		
	F619SB015	11.0		=		
Potassium	F619SB001	135	mg/kg	J	NL	195 to 3,790
	F619SB004	2,330		J		
	F619SB015	1,460		J		
Selenium	F619SB001	0.4	mg/kg	J	17	0.40 to 1.7
	F619SB004	1.9		=		
	F619SB015	1.7		=		
Sodium	F619SB001	96.8	mg/kg	J	NL	289 to 3,890
	F619SB004	2,100		=		
	F619SB015	483		J		
Tin	F619SB001	3.2	mg/kg	J	NL	1.1 to 2.9
	F619SB004	5.3		J		
	F619SB015	7.1		J		
Vanadium	F619SB001	6.0	mg/kg	=	12,400	5.9 to 112
	F619SB004	48.4		=		
	F619SB015	39.6		=		
Zinc	F619SB001	6.6	mg/kg	J	27,800	9.3 to 198
	F619SB004	255.0		J		
	F619SB015	91.1		J		

[a] Zone F SSL Calculations -- AOC 619/SWMU 4 & AOC 620/SWMU36
[b] Subsurface soil background range values are the minimum and maximum concentrations detected in Zones F and G combined grid samples.
[c] Default lead SSL = 400 mg/kg

= Chemical is detected at concentration shown.
J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

TABLE 3-6
Organics Detected in Groundwater
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	MCL	Background Reference Concentration
Ethylbenzene	F620GW001	1.0	µg/L	J	700	NA
Xylenes, Total	F620GW001	7.0	µg/L	=	10,000	NA

= Chemical is detected at concentration shown.
J Chemical is detected at a concentration below the method detection limit; the concentration is not known.
NA Not available
NL Not listed

TABLE 3-7
Metals Detected in Groundwater
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location[a]	Concentration	Unit	Qualifier	MCL/RBC[b]	Background Reference Concentration
Aluminum	F619GW002	323	µg/L	=	36,000	77.7
	F619GW003	117		=		
	F620GW001	834		=		
Antimony	F620GW001	1.9	µg/L	J	6	NA
Arsenic	F620GW001	6.3	µg/L	J	50	16.2
Barium	F619GW001	10.5	µg/L	=	2,000	200
	F619GW002	18.5		=		
	F619GW003	64.5		=		
	F620GW001	317		J		
Calcium	F619GW001	19,500	µg/L	=	NL	NA
	F619GW002	52,600		=		
	F619GW003	14,4000		=		
	F620GW001	95,600		=		
Chromium, Total	F619GW002	1.9	µg/L	J	100	1.31
	F619GW003	2.3		J		
	F620GW001	8.0		J		
Cobalt	F619GW003	0.9	µg/L	J	2,200	67
	F620GW001	1.1		J		
Copper	F619GW003	3.2	µg/L	J	1,300	NA
Iron	F619GW001	961	µg/L	=	11,000	NA
	F619GW002	459		=		
	F619GW003	5,720		=		
	F620GW001	3,710		J		
Magnesium	F619GW001	3,310	µg/L	=	NL	NA
	F619GW002	16,700		=		
	F619GW003	223,000		=		
	F620GW001	213,000		=		
Manganese	F619GW001	14.1	µg/L	=	730	1,260
	F619GW002	90.9		=		
	F619GW003	934		=		
	F620GW001	186		=		
Nickel	F620GW001	4.3	µg/L	J	730	61.1

TABLE 3-7
Metals Detected in Groundwater
RFI Addendum, SWMU 4/AOC 619, Zone F, CNC

Parameter	Location[a]	Concentration	Unit	Qualifier	MCL/RBC[b]	Background Reference Concentration
Potassium	F619GW001	2,930	µg/L	=	NL	NA
	F619GW002	24,000		=		
	F619GW003	87,100		=		
	F620GW001	25,500		=		
Sodium	F619GW002	284,000	µg/L	=	NL	NA
	F619GW003	2,590,000		=		
	F620GW001	611,000		=		
Vanadium	F619GW001	1.1	µg/L	J	260	1.13
	F619GW002	14.7		=		
	F619GW003	5.6		J		
	F620GW001	18.8		J		

[a] Metals data from geoprobe samples not considered
[b] Concentrations listed in italics are for parameters that have no MCL values; tap water RBCs used from EPA Region III RBC tables (October, 2000)

= Chemical is detected at concentration shown.
J Chemical is detected at a concentration below the method detection limit; the concentration is not known.
NA Not available
NL Not listed

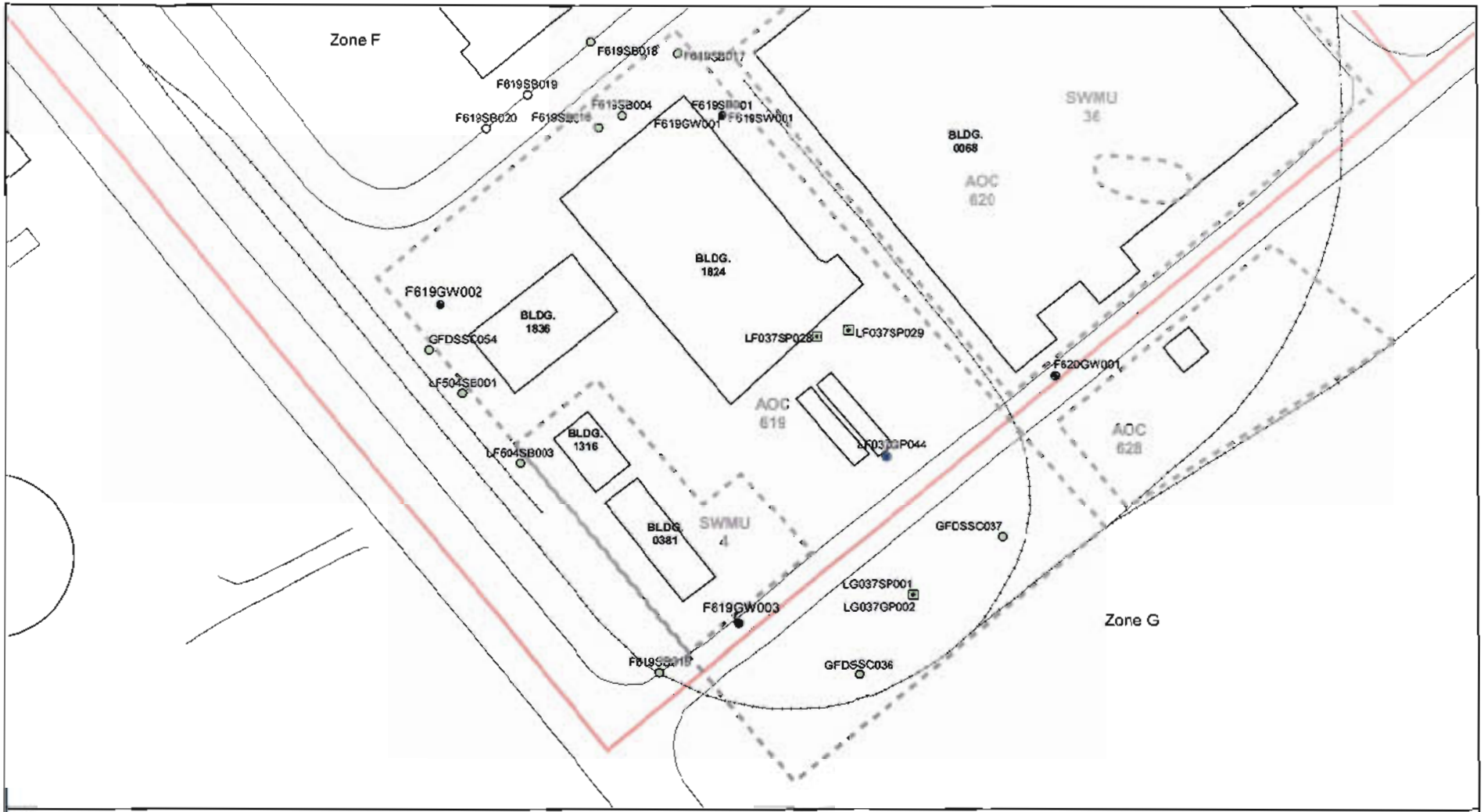


Figure 3-1
AOC 619/SWMU 4
RFI Addendum Sample Locations
Charleston Naval Complex

CH2MHILL

SECTION 4.0

COPC/COC Refinement

Table 4-2 for comparison. These metals concentrations do not exceed the current screening criteria, and therefore are not considered COPCs.

Organic analytes reported in the *Zone F RFI Report, Revision 0* that exceeded screening criteria included benzene, methylene chloride, and TCE. Table 4-3 presents a summary of analytical results for these chemicals from all surface and subsurface soil samples analyzed at the site. The data in Table 4-3 indicate that these chemicals were detected in few locations, and each exceedance occurred in a single soil sample. Two of the detections (for benzene and TCE) occurred in a sample collected at boring F619SB001. Groundwater samples collected from a monitor well installed at this location (F619GW001) have not had detections of these or other VOCs. Groundwater samples from the other site monitor wells also have not contained detectable concentrations of these compounds, indicating that significant leaching of these chemicals is not occurring. As described in the *EPA Soil Screening Guidance: Technical Background Document* (EPA, 1996), the average concentration in a release area needs to exceed an SSL in order for the migration from soil to groundwater to be of concern at a site. A sitewide average concentration of each of these three constituents in soil, as shown in Table 4-3 taking the highest concentration of surface or subsurface soil from each sample location, indicates that their corresponding SSLs are not exceeded on a sitewide basis.

4.3 Groundwater

Iron, chloromethane, and thallium, were identified in the *Zone F RFI Report, Revision 0* as exceeding screening criteria in groundwater. These three constituents are described below.

The maximum iron concentration detected in the site monitor wells (32,000 µg/L) is within the range of iron concentrations detected in the grid (background) wells from combined Zones F and G (2,000 to 62,300 µg/L). Iron is one of the most commonly occurring minerals and is naturally found in shallow groundwater at the CNC and Charleston area at concentrations similar to the levels detected at this site. Based on these considerations, iron is not considered a COPC at this site.

Thallium was detected in four of the 12 groundwater samples collected at the site, from three different wells. Three of the detects are "J" flagged, or estimated concentrations (3.4 µg/L, 6.6 µg/L, and 6.8 µg/L) near the method detection limit (MDL). The fourth detect, 11 µg/L, was not flagged. Three of the detects were identified during the first sampling event. Except for F619GW001, which showed a detect of 6.8 J µg/L in the second round of sampling, the wells did not contain detectable amounts of thallium in subsequent rounds.

Table 4-4 shows the thallium analysis results for groundwater at the site. The most recent data from the site indicate that thallium is not present above the reporting limits. Additionally, no source of thallium in soil, indicating the occurrence of a release, has been identified during the RFI. Based on these considerations, thallium is not considered a COC at this site.

Chloromethane was detected at an estimated ("J" flagged) concentration of 8 µg/L in the groundwater sample recovered from F619GW003 during the first round of RFI sampling. This result was not reproducible during subsequent sampling events. Chloromethane was not detected in groundwater samples collected from F619GW001, F619GW002, or F620GW001, nor in any soil samples at the site. Chloromethane is a common laboratory contaminant. Additionally, no source area of chloromethane in soil, indicating the occurrence of a release, was identified during the RFI. Based on these considerations, chloromethane is not considered a COC.

No COPCs were identified during the sampling activities subsequent to the original RFI activities.

TABLE 4-1
Surface Soil COPC Refinement; BEQs, Iron, and Manganese Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, Charleston Naval Complex

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
BEQs	F004SB001	0.462	mg/kg	=	NA	0.08749	0.78	1.304[d]
	F004SB002	0.307		=				
	F619SB001	0.477		=				
	F619SB002	0.301		=				
	F619SB004	0.745		=				
	F619SB005	0.356		=				
	F619SB006	0.474		=				
	F619SB007	0.373		=				
	F619SB008	0.280		=				
	F619SB009	0.444		=				
	F619SB011	0.376		=				
	F619SB013	0.391		=				
	F619SB015	0.420		=				
	F619SB017	0.321		=				
	LF504SB001	0.769		=				
	LF504SB003	1.041		=				
Iron	F004SB001	6,470	mg/kg	=	1,270,000	2,346	61,320	3570 - 32,700
	F004SB002	6,190		=				
	F004SB003	3,080		=				
	F004SB004	1,360		=				
	F619SB001	11,800		=				
	F619SB001 (SPLP location)	11,900		=				
	F619SB002	15,000		=				
	F619SB004	14,000		=				
	F619SB004 (SPLP location)	4,790		=				
	F619SB005	4,640		=				
	F619SB006	888		=				
	F619SB007	15,500		=				
	F619SB008	6,300		=				
	F619SB009	5,400		=				
	F619SB010	5,240		=				
	F619SB011	7,800		=				
	F619SB012	2,120		=				
	F619SB013	9,360		=				
	F619SB014	1,840		=				
	F619SB015	18,900		=				
	F619SB015 (SPLP location)	8,570		=				
	LF037SP028	20,100		=				
	LF037SP029	12,400		=				

TABLE 4-1
Surface Soil COPC Refinement; BEQs, Iron, and Manganese Detected in Surface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, Charleston Naval Complex

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL[a] (DAF=24.8)	Region III Residential Soil RBC[b]	Region III Industrial Soil RBC[b]	Surface Background Concentration Range[c]
Iron	LF504SB001	6,130	mg/kg	=	1,270,000	2,346	61,320	3570 - 32,700
	LF504SB003	12,500		=				
	LG037SP001	17,100		=				
Manganese	F004SB001	66.7	mg/kg	=	436,000	156.4	4,088	32 - 436
	F004SB002	86.2		=				
	F004SB003	13.8		=				
	F004SB004	20.4		=				
	F619SB001	104.0		=				
	F619SB001 (SPLP location)	167		=				
	F619SB002	115.0		=				
	F619SB004	283.0		J				
	F619SB004 (SPLP location)	83.3		=				
	F619SB005	43.9		J				
	F619SB006	9.1		=				
	F619SB007	216.0		J				
	F619SB008	110.0		J				
	F619SB009	54.5		J				
	F619SB010	81.0		=				
	F619SB011	150.0		J				
	F619SB012	243.0		=				
	F619SB013	118.0		=				
	F619SB014	8.2		=				
	F619SB015	320.0		=				
	F619SB015 (SPLP location)	110		=				
	LF037SP028	207		=				
	LF037SP029	111		=				
	LF504SB001	80.3		=				
	LF504SB003	106		=				
	LG037SP001	176		=				

[a] Zone F SSL Calculations -- AOC 619/SWMU 4 & AOC 620/SWMU36
[b] Residential and Industrial RBCs obtained from the EPA Region III RBC Table (October, 2000). HI=0.1 is used for non-carcinogenic compounds; HI=1.0 is used for carcinogenic compounds.
[c] Surface soil background range values are the minimum and maximum concentrations detected in Zones F and G combined grid samples.
[d] Sitewide background concentration for surface soil taken from *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values* (CH2M-Jones, 2001).

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

TABLE 4-2
Subsurface Soil COPC Refinement; Chromium and Thallium Detected in Subsurface Soil
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Concentration	Unit	Qualifier	Soil-to-Groundwater SSL (DAF=24.8)	Subsurface Background Concentration Range[b]
Chromium	F004SB001	25.2	mg/kg	=	8,380[a]	7.4 - 65
	F004SB002	36.6		=		
	F004SB003	38.8		=		
	F004SB004	28.1		=		
	F619SB001	2.7		=		
	F619SB001 (SPLP location)	4.5		J		
	F619SB004	40.4		J		
	F619SB004 (SPLP location)	32.1		J		
	F619SB009	43.4		J		
	F619SB010	42.8		=		
	F619SB012	4.2		=		
	F619SB013	32.6		=		
	F619SB014	21.0		=		
	F619SB015	30.4		=		
	F619SB015 (SPLP location)	28.4		J		
Thallium	F619SB009	1.40	mg/kg	J	4.51[c]	0.4 - 1.2
	F619SB013	0.50		J		

[a] Zone F SSL Calculations -- AOC 619/SWMU 4 & AOC 620/SWMU36
[b] Subsurface soil background range is the minimum and maximum concentrations detected in Zones F and G combined grid samples.
[c] Region III SSL for DAF = 24.8 for thallium from RBC table (October, 2000).

= Chemical is detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

TABLE 4-3
COPC Refinement; Soil to Groundwater Migration - Organics
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Unit	Surface Concentration	Qualifier	Subsurface Concentration	Qualifier	Maximum Concentration	Qualifier	Averaging Concentration [a]	Soil-to-Groundwater SSL [b] (DAF=24.8)
Benzene	F004SB001	mg/kg	0.006	U	0.008	U	0.008	U	0.004	0.037
	F004SB002		0.006	U	0.008	U	0.008	U	0.004	
	F004SB003		0.006	U	0.007	J	0.007	J	0.007	
	F004SB004		0.006	U	0.007	UJ	0.007	U	0.0035	
	LF504SB003		0.006	U			0.006	U	0.003	
	F619SB001		0.006	U	**0.062**	=	**0.062**	=	0.062	
	F619SB001 (SPLP location)		0.004	U	0.003	U	0.004	U	0.002	
	F619SB002		0.006	U			0.006	U	0.003	
	F619SB004		0.006	U	0.017	U	0.017	U	0.0085	
	F619SB004 (SPLP location)				0.005	U	0.005	U	0.0025	
	F619SB005		0.006	U			0.006	U	0.003	
	F619SB006		0.029	U			0.029	U	0.0145	
	F619SB007		0.007	UJ			0.007	U	0.0035	
	F619SB008		0.006	U			0.006	U	0.003	
	F619SB009		0.006	U	0.044	U	0.044	U	0.022	
	F619SB010		0.006	U	0.009	U	0.009	U	0.0045	
	F619SB011		0.006	UJ			0.006	U	0.003	
	F619SB012		0.006	U	0.006	U	0.006	U	0.003	
	F619SB013		0.006	UJ	0.007	U	0.007	U	0.0035	
	F619SB014		0.005	U	0.006	U	0.006	U	0.003	
	F619SB015				0.008	UJ	0.008	U	0.004	
	F619SB015 (SPLP location)		0.004	UJ	0.006	U	0.006	U	0.003	
	LG037SP001		0.007	U			0.007	U	0.0035	
	LF037SP028		0.010	U			0.010	U	0.005	
	LF037SP029		0.006	U			0.006	U	0.003	
								Mean	**0.00724**	**0.037**

TABLE 4-3
COPC Refinement; Soil to Groundwater Migration - Organics
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Unit	Surface Concentration	Qualifier	Subsurface Concentration	Qualifier	Maximum Concentration	Qualifier	Averaging Concentration [a]	Soil-to-Groundwater SSL [b] (DAF=24.8)
Methylene	F004SB001	mg/kg	0.006	U	0.008	U	0.008	U	0.004	0.0248
Chloride	F004SB002		0.006	U	0.008	U	0.008	U	0.004	
	F004SB003		0.006	U	0.022	UJ	0.022	U	0.011	
	F004SB004		0.006	J	0.032	U	0.006	J	0.006	
	LF504SB003		0.043	U			0.043	U	0.0215	
	F619SB001		0.004	U	0.016	U	0.016	U	0.008	
	F619SB001 (SPLP location)		0.004	U	0.006	U	0.006	U	0.003	
	F619SB002		0.004	U			0.004	U	0.002	
	F619SB004		0.012	U	**0.098**	=	**0.098**	=	0.098	
	F619SB004 (SPLP location)				0.007	U	0.007	U	0.0035	
	F619SB005		0.002	J			0.002	J	0.002	
	F619SB006		0.029	U			0.029	U	0.0145	
	F619SB007		0.007	U			0.007	U	0.0035	
	F619SB008		0.020	U			0.020	U	0.01	
	F619SB009		0.006	U	0.088	U	0.088	U	0.044	
	F619SB010		0.008	U	0.006	U	0.008	U	0.004	
	F619SB011		0.006	U			0.006	U	0.003	
	F619SB012		0.006	U	0.006	U	0.006	U	0.003	
	F619SB013		0.026	UJ	0.007	U	0.026	U	0.013	
	F619SB014		0.005	U	0.006	U	0.006	U	0.003	
	F619SB015				0.022	UJ	0.022	U	0.011	
	F619SB015 (SPLP location)		0.008	UJ	0.006	U	0.008	U	0.004	
	LG037SP001		0.007	U			0.007	U	0.0035	
	LF037SP028		0.010	U			0.010	U	0.005	
	LF037SP029		0.006	U			0.006	U	0.003	
								Mean	**0.0115**	**0.0248**

TABLE 4-3
COPC Refinement; Soil to Groundwater Migration - Organics
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Unit	Surface Concentration	Qualifier	Subsurface Concentration	Qualifier	Maximum Concentration	Qualifier	Averaging Concentration [a]	Soil-to-Groundwater SSL [b] (DAF=24.8)
TCE	F004SB001	mg/kg	0.006	U	0.008	U	0.008	U	0.004	0.0744
	F004SB002		0.006	U	0.008	U	0.008	U	0.004	
	F004SB003		0.006	U	0.008	J	0.008	J	0.008	
	F004SB004		0.006	U	0.003	J	0.003	J	0.003	
	LF504SB003		0.006	U			0.006	U	0.003	
	F619SB001		0.006	U	0.062	=	0.062	=	0.062	
	F619SB001 (SPLP location)		0.004	U	0.003	U	0.004	U	0.002	
	F619SB002		0.006	U			0.006	U	0.003	
	F619SB004		0.002	J	0.017	U	0.002	J	0.002	
	F619SB004 (SPLP location)				0.005	U	0.005	U	0.0025	
	F619SB005		0.006	U			0.006	U	0.003	
	F619SB006		0.029	U			0.029	U	0.0145	
	F619SB007		0.007	UJ			0.007	U	0.0035	
	F619SB008		0.006	U			0.006	U	0.003	
	F619SB009		0.006	U	0.044	U	0.044	U	0.022	
	F619SB010		0.002	J	0.009	U	0.002	J	0.002	
	F619SB011		0.006	UJ			0.006	U	0.003	
	F619SB012		0.006	U	0.006	U	0.006	U	0.003	
	F619SB013		0.002	J	0.007	U	0.002	J	0.002	
	F619SB014		0.005	U	0.006	U	0.006	U	0.003	
	F619SB015				0.010	J	0.010	J	0.01	
	F619SB015 (SPLP location)		0.004	UJ	0.006	U	0.006	U	0.003	
	LG037SP001		0.007	U			0.007	U	0.0035	
	LF037SP028		0.010	U			0.010	U	0.005	
	LF037SP029		0.006	U			0.006	U	0.003	
								Mean	**0.00708**	**0.0744**

TABLE 4-3
COPC Refinement; Soil to Groundwater Migration - Organics
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Unit	Surface Concentration	Qualifier	Subsurface Concentration	Qualifier	Maximum Concentration	Qualifier	Averaging Concentration [a]	Soil-to-Groundwater SSL [b] (DAF=24.8)

Concentrations that exceed screening criteria are highlighted and in bold.

[a] for averaging, non-detect values taken at one-half reported detection limit

[b] SSL taken from EPA Region 9 PRG Table (November, 2000) adjusted for site-specific DAF=24.8.

= Chemical detected at concentration shown.

J Chemical is detected at a concentration below the method detection limit; the concentration is not known.

U Chemical is not detected above reported limit.

UJ Not detected above reporting limit; reporting limit estimated.

TABLE 4-4
COPC Refinement; Thallium in Groundwater
RFI Report Addendum, AOC 619/SWMU 4, Zone F, CNC

Parameter	Location	Sample	Date	Concentration	Qualifier	Unit	MCL	Background Reference Concentration
Thallium	F619GW001	619GW00101	11/10/1996	3.4	J	µg/L	2	5.58
	F619GW001	619GW00102	05/07/1997	**6.8**	**J**			
	F619GW001	619GW00103	09/10/1997	5.0	U			
	F619GW001	619GW00104	12/01/1997	5.0	U			
	F619GW002	619GW00201	11/10/1996	2.7	U	µg/L		
	F619GW002	619GW00202	05/09/1997	5.1	U			
	F619GW002	619GW00203	09/10/1997	5.0	U			
	F619GW002	619GW00204	11/25/1997	5.0	U			
	F619GW003	619GW00301	11/09/1996	**6.6**	**J**	µg/L		
	F619GW003	619GW00302	05/08/1997	7.0	U			
	F619GW003	619GW00303	09/11/1997	5.0	U			
	F619GW003	619GW00304	11/25/1997	5.0	U			
	F620GW001	620GW00101	11/08/1996	**11.0**	**=**	µg/L		
	F620GW001	620GW00102	05/09/1997	6.6	U			
	F620GW001	620GW00103	08/29/1997	5.0	U			
	F620GW001	620GW00104	11/19/1997	5.0	U			

Concentrations that exceed screening criteria are highlighted in bold.
= Chemical is detected at concentration shown.
J Chemical is detected at a concentration below the method detection limit; the concentration is not known.
U Chemical is not detected above reported limit.

SECTION 5.0

Summary of Information Related to Site Closeout Issues

5.0 Summary of Information Related to Site Closeout Issues

5.1 RFI Status

The *Zone F RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within the CNC, including AOC 619/SWMU 4. The subsequent *Zone F RFI Report Work Plan Addendum* (EnSafe, 1999) presented sampling and testing to address data gaps at AOC 619/SWMU 4. The samples were collected in 1999, and the results are reported in Section 3.0 of this RFI Report Addendum. Section 3.0 also presents data associated with Zone L, collected within the AOC 619 boundary.

In accordance with the RFI completion process, if a determination of no further investigation (NFI) is made upon completion of the RFI, then a site may proceed to either NFA status or to a CMS. Because no COCs are present in soil or groundwater, CH2M-Jones recommends this site for NFA.

The remaining subsections address issues which the BCT agreed to evaluate prior to site closeout.

5.2 Presence of Inorganics in Groundwater

For the purpose of site closeout documentation, the inorganics in groundwater issue refers to the occasional or intermittent detection of several metals (primarily arsenic, thallium, and antimony) in groundwater at concentrations above the applicable MCL, preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit.

Arsenic and antimony have not been detected above MCLs. Thallium has been sporadically detected (in four out of 16 samples) at SWMU 4/AOC 619. Thallium was detected only in the first or second sampling round, and not in subsequent rounds. The concentrations are not reproducible. As discussed in Section 4.3 of this RFI Report Addendum, further evaluation of inorganics in groundwater at this site is not warranted.

No corrective action for groundwater at this site is warranted.

5.3 Potential Linkage to SWMU 37, Investigated Sanitary Sewers at the CNC

The sanitary sewer service line which connects to Building 1824, as well as the sewer main which parallels Kilo Street at the south side of the site, were included in the Zone L utility corridor investigation. These utilities are shown in Figure 5-1. Soil and groundwater probes advanced in this area are designated "LF" or "LG" in Figure 3-1; all detects (except for metals from groundwater probe samples) are summarized in the analytical summary tables provided in Section 3.0. FDS investigation borings (designated "GFDS") were also advanced in the immediate vicinity of the sanitary main which parallels Kilo Street. No impacts to subsurface soil or groundwater exceeding comparison criteria were determined as a result of this investigation, and no further evaluation of this issue is required. There is no evidence that releases from the sanitary sewers at this site have occurred or have impacted the environment.

5.4 Potential Linkage to AOC 699, Investigated Storm Sewers at the CNC

The storm water collection system located west of AOC 619 was included in the Zone L utility corridor investigation. Soil and groundwater probes advanced in this area are designated "LF" or "LG" in Figure 3-1; all detects (except for metals from groundwater probe samples) are summarized in the Section 3.0 analytical summary tables. No impacts exceeding comparison criteria to subsurface soil were determined as a result of this investigation, and no further evaluation of this issue is warranted.

5.5 Potential Linkage to AOC 504, Investigated Railroad Lines at the CNC

The rail lines which traverse the periphery of the site were investigated by a combination of samples collected during the RFI, and FDS and utility corridor borings ("LF" and "GFDS" in Figure 3-1). All samples from Zone L that were within the AOC 619 area were included in the data evaluation for this site. No impacts to surface or subsurface soils exceeding comparison criteria were determined as a result of this investigation, and no further evaluation of this issue is warranted.

5.6 Potential Migration Pathways to Surface Water Bodies at the CNC

Two potential migration pathways from the site to surface water are overland flow via storm water runoff, and subsurface flow via groundwater. There were no COPCs in surface soil at AOC 619; therefore, further evaluation of a potential pathway for contaminant migration via storm water runoff is not warranted.

In addition, the soil-to-groundwater pathway is considered invalid at this site because there are no COCs in soil to leach into groundwater. Therefore, further evaluation of migration of potentially contaminated groundwater to a surface water body is not warranted.

5.7 Potential Contamination in Oil/Water Separators (OWSs)

The issue of potential contamination of OWSs refers to the possible presence of an OWS that has not yet been investigated at a SWMU or AOC as part of the RCRA or underground storage tank (UST) process.

Neither the RCRA Facility Assessment (RFA) nor the RFI refer to the presence or possible presence of an OWS at AOC 619/SWMU 4. There is no visual evidence of an OWS at this site, and there is no reference made to an OWS at this facility in the *Oil Water Separator Data* (Navy, 2000). Therefore, further evaluation of this issue at AOC 619/SWMU 4 is not warranted.

5.8 Land Use Control Management Plan

The RFI Report Addendum screening did not identify any COCs in soil or groundwater at AOC 619/SWMU 4, based on unrestricted land use criteria, which are conservative for this industrial area. Therefore, land use controls are not necessary for SWMU 4/AOC 619.

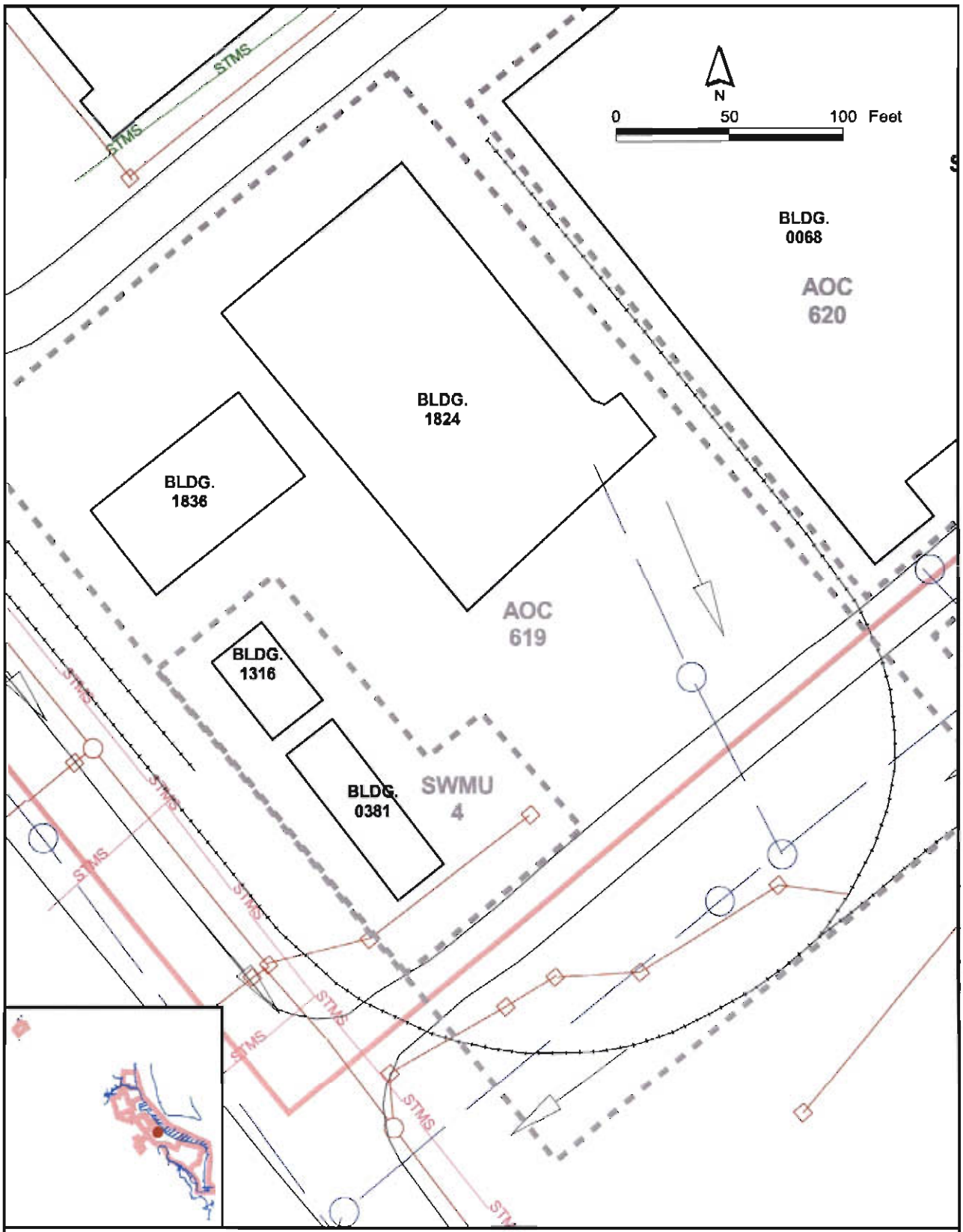


Figure 5-1
AOC 619/SWMU 4
Sewer Lines
Charleston Naval Complex

CH2MHILL

File Path: o:\18gis\cnc\aoc619.apr, Date: 03 May 2001 10:01, User: SHANEY

SECTION 6.0

Recommendations

6.0 Recommendations

AOC 619 is the site of a former waste oil storage yard, which was active from 1955 to 1982. Historical records indicate that site activities included storage, transfer, and distribution of petroleum waste and/or fuel via subsurface conveyance piping and two 15,000-gallon ASTs. These tanks were constructed in 1964. Waste oil and sludge delivered to the site using rail cars was transferred into the tanks for temporary storage until 1980, at which time they were upgraded for gasoline storage, including installation of a concrete containment sump. There have been no reports or observations indicating any past spills or contaminants that may have been discharged to the environment. AOC 619 also encompasses Building 1824, a hazardous materials storage facility constructed in 1990. No releases have been documented from this structure.

SWMU 4 consists of Buildings 1316, used for tool storage, and 381, used for pesticide formulation and storage from approximately 1981 until 1985. There have been no documented releases from this structure.

According to the *Zone F RFI Report, Revision 0* (EnSafe, 1997) iron, thallium, benzene, methylene chloride, and BEQs were identified as COPCs in soil, while chloromethane and thallium were identified as COPCs in groundwater. A re-evaluation of these chemicals determined that iron, thallium, and BEQs do not exceed BRCs or site-specific SSLs. Benzene and methylene chloride in soil were evaluated as recommended in the *EPA Soil Screening Guidance: Technical Background Document* (EPA, 1996), and were determined to have mean concentrations less than site-specific SSLs. These compounds have not been detected in site groundwater. Therefore, they are not considered COCs at this site.

The single detection of chloromethane in groundwater is not representative and not reproducible at this site; therefore, it is not considered a COC. Likewise, detected thallium concentrations above its BRC are not reproducible in site groundwater. Therefore, these two chemicals are not considered COCs at SWMU 4/AOC 619, and do not warrant corrective action.

Although the *Zone F RFI Report, Revision 0* concludes that a CMS is appropriate for AOC 619/SWMU 4 as stated in the recommendations provided in Appendix A of the RFI report; the evaluation of COPCs as presented in Section 4.0 of this RFI Report Addendum concludes that corrective action is not necessary. This RFI Report Addendum further

concludes that NFA is appropriate at SWMU 4/AOC 619. Further investigation or corrective action is not necessary.

Once the BCT concurs that NFA is appropriate for the site, a Statement of Basis will be prepared that will be made available for public comment in accordance with SCDHEC policy. This will allow for public participation in the final remedy selection.

SECTION 7.0

References

7.0 References

CH2M-Jones. *Background PAHs Study Report: Technical Information for the Development of Background BEQ Values*. February 2001.

EnSafe Inc. *Zone F RFI Report, NAVBASE Charleston*. Revision 0. December 31, 1997.

EnSafe Inc. *Zone L RFI Report, NAVBASE Charleston*. Revision 0. December 31, 1998.

EnSafe Inc. *Zone F RFI Report Work Plan Addendum, NAVBASE Charleston*. Revision 0. November 3, 1999.

U.S. Environmental Protection Agency. U.S. Environmental Protection Agency. *EPA Soil Screening Guidance: Technical Background Document* (Table A-1), EPA/540/R-95/128. May 1996.

APPENDIX A

Excerpts from the *Zone F RFI Report, Revision 0*

ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVBASE CHARLESTON

VOLUME II of V
SECTIONS 10 to 10.4

CONTRACT N62467-89-D-0318
CTO-029

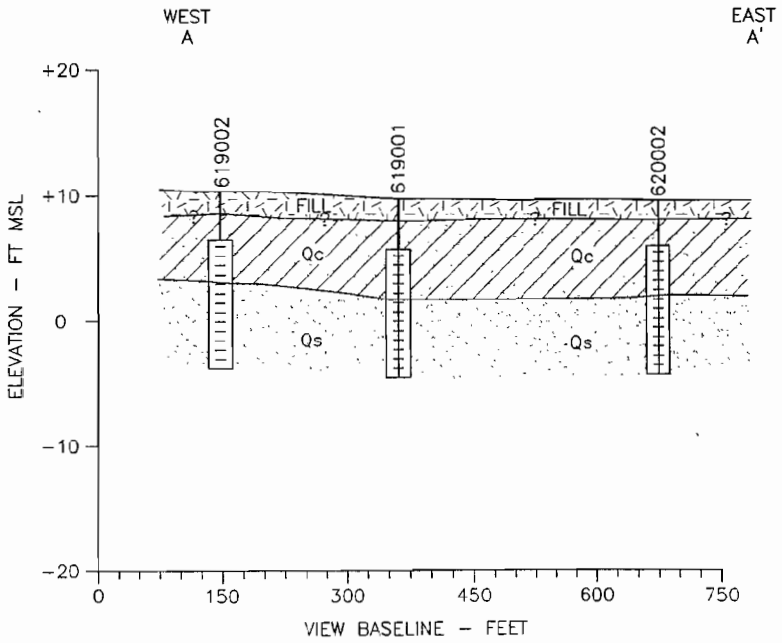
Prepared for:

Comprehensive Long-Term Environmental Action Navy
(CLEAN)
Charleston Naval Shipyard
Charleston, South Carolina

Prepared by:

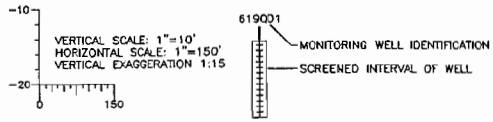
EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901)372-7962

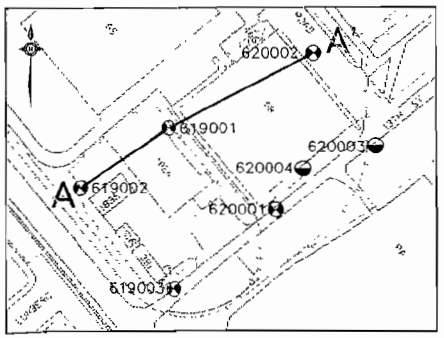
December 31, 1997
Revision: 0



LEGEND

FILL	Undifferentiated mixture of medium to high plasticity clays, fine sand, silt, gravel and ROC. Varies greatly with location.
Qc	QUATERNARY CLAYEY SAND AND SILTY SAND--brown, orange-brown, gray, green, and tan, very fine to fine sand often with trace medium grains, varying amounts of silt and inorganic gray clay; often interbedded with soft gray, medium plasticity clay laminae; sand occasionally unconsolidated and loose. AQUIFER
Qs	QUATERNARY SAND--undifferentiated olive-brown,gray, and orange sand; primarily very fine to fine and moderately to well-sorted but typically increases in grain size with depth (from fine to medium with some coarse); clean to silty sand. AQUIFER.

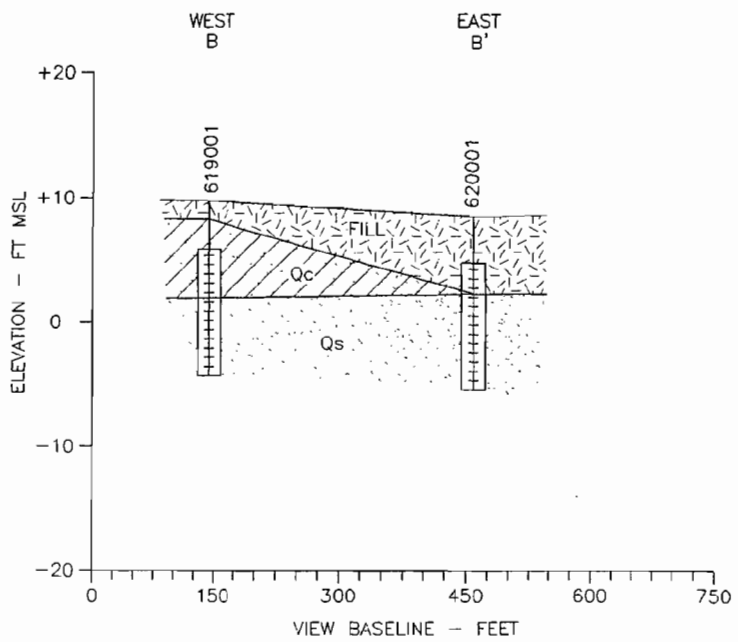




ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.

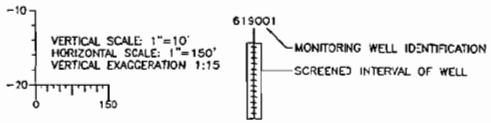
FIGURE 10.1-2
SWMU 4, AOC 619 AND 620
LITHOLOGIC CROSS SECTION A-A'

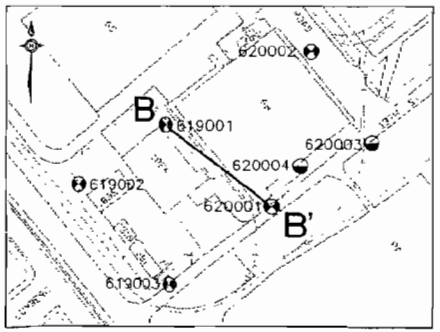
DWG DATE: 11/07/97 | DWG NAME: 2906CAA2



LEGEND

FILL	Undifferentiated mixture of medium to high plasticity clays, fine sand, silt, gravel and ROC. Varies greatly with location.
Qc	QUATERNARY CLAYEY SAND AND SILTY SAND--brown, orange-brown, grey, green, and tan, very fine to fine sand often with trace medium grains, varying amounts of silt and inorganic grey clay; often interbedded with soft gray, medium plasticity clay laminae; sand occasionally unconsolidated and loose. AQUIFER
Qs	QUATERNARY SAND--undifferentiated olive-brown,gray, and orange sand; primarily very fine to fine and moderately to well-sorted but typically increases in grain size with depth (from fine to medium with some coarse); clean to silty sand. AQUIFER.

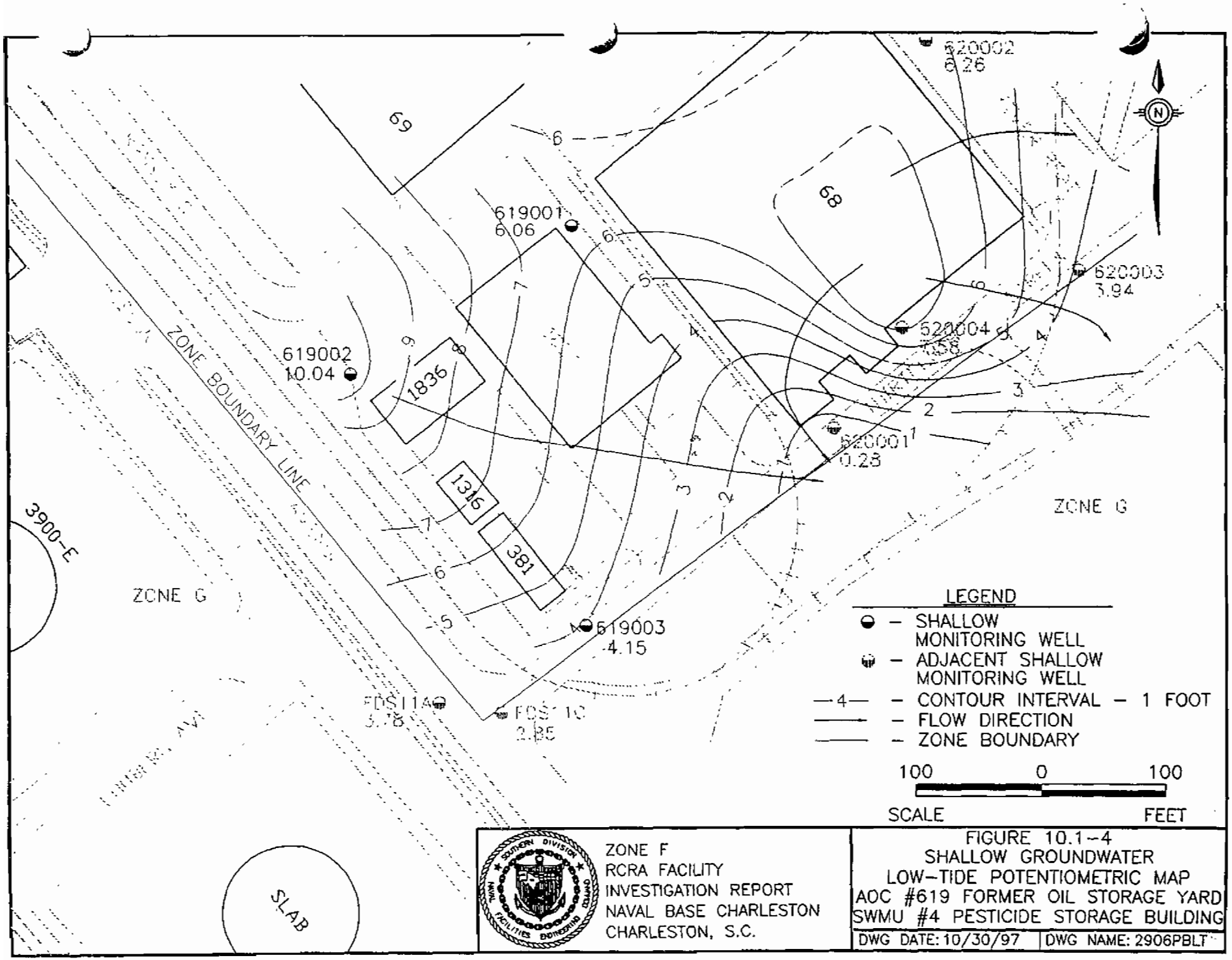




ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.

FIGURE 10.1-3
SWMU 4, AOC 619 AND 620
LITHOLOGIC CROSS SECTION B-B'

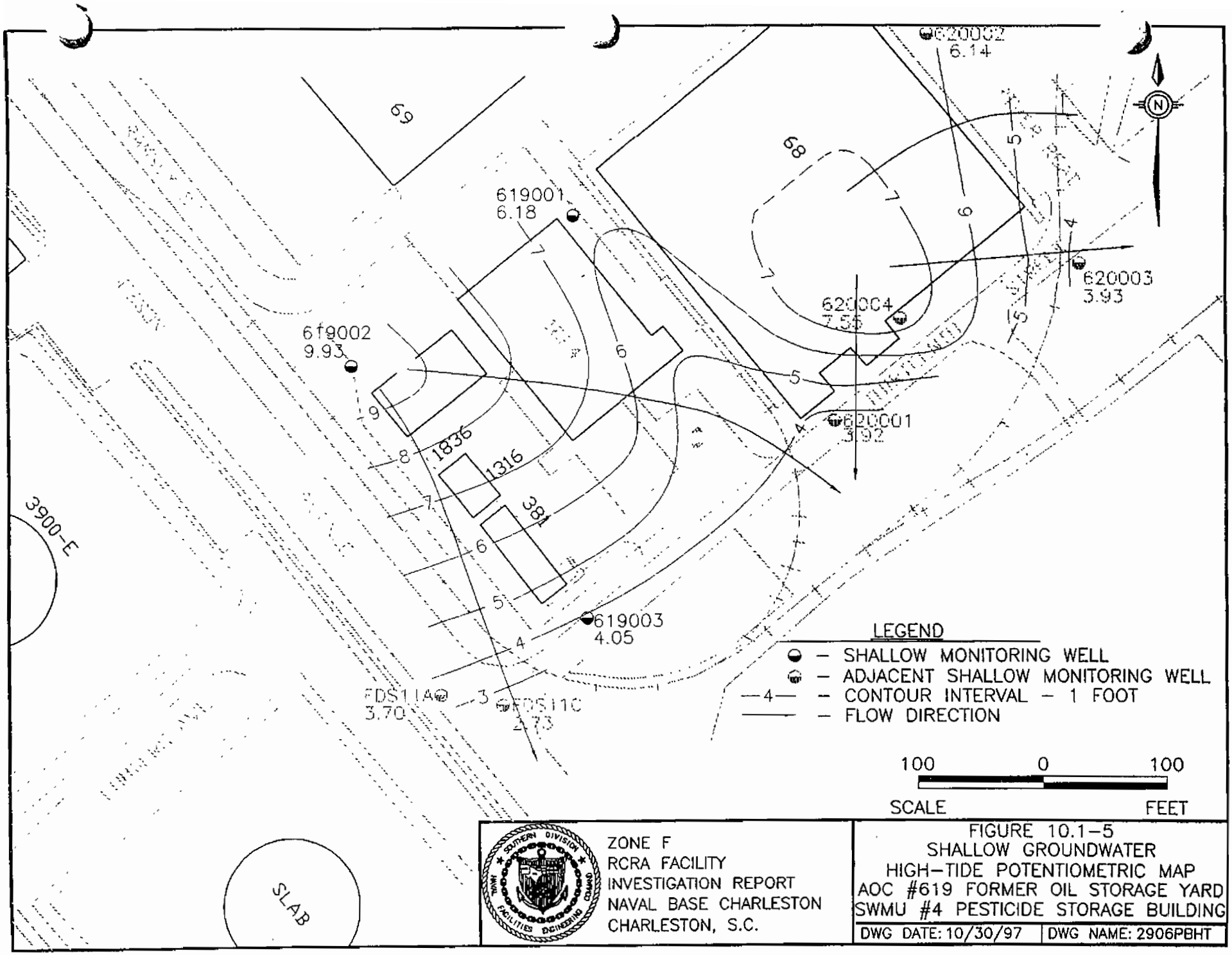
DWG DATE: 11/07/97 | DWG NAME: 2906CBB2



ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.

FIGURE 10.1-4
SHALLOW GROUNDWATER
LOW-TIDE POTENTIOMETRIC MAP
AOC #619 FORMER OIL STORAGE YARD
SWMU #4 PESTICIDE STORAGE BUILDING

DWG DATE: 10/30/97 | DWG NAME: 2906PBLT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6.14
619001
6.18
620003
3.93
620004
7.55
619002
9.93
620001
3.92
619003
4.05
FDS11A
3.70
FDS11C
2.73
1836
1316
3900-E
SLAB
LEGEND
— SHALLOW MONITORING WELL
— ADJACENT SHALLOW MONITORING WELL
—4— — CONTOUR INTERVAL — 1 FOOT
— FLOW DIRECTION
100 0 100
SCALE FEET
ZONE F
RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.
FIGURE 10.1-5
SHALLOW GROUNDWATER
HIGH-TIDE POTENTIOMETRIC MAP
AOC #619 FORMER OIL STORAGE YARD
SWMU #4 PESTICIDE STORAGE BUILDING
DWG DATE: 10/30/97
DWG NAME: 2906PBHT

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Volatile Organic Compounds (µg/kg)							
1,1-Dichloroethene	004SB003	ND	1100	NA	4.0	60	NA
	619SB001	ND			44.0		
1,2-Dichloroethene (total)	619SB015	ND	70000	NA	2.0	400	NA
2-Butanone (MEK)	619SB001	4.0	4700000	NA	10.0	7900	NA
	619SB004	7.0			46.0		
	619SB011	4.0			NT		
Benzene	004SB003	ND	22000	NA	7.0	30	NA
	619SB001	ND			62.0		
Carbon disulfide	004SB003	ND	780000	NA	12.0	32000[a]	NA
	004SB004	ND			15.0		
	619SB010	ND			6.0		
	619SB013	7.0			2.0		
	619SB015	NC			6.0		
Chlorobenzene	004SB003	ND	160000	NA	6.0	1000	NA
	619SB001	ND			64.0		
Chloroform	004SB004	ND	100000	NA	2.0	600	NA
Methylene chloride	004SB004	6.0	85000	NA	ND	20[b]	NA
	619SB004	ND			98.0		
	619SB005	2.0			NT		
	619SB015	2.0			ND		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Toluene	004SB003	ND	1600000	NA	6.0	12000	NA
	619SB001	ND			61.0		
Trichloroethene	004SB003	ND	58000	NA	8.0	60	NA
	004SB004	ND			3.0		
	619SB001	ND			**62.0**		
	619SB004	2.0			ND		
	619SB010	2.0			ND		
	619SB013	2.0			ND		
	619SB015	ND			10.0		
Semivolatile Organic Compounds (µg/kg)							
BEQs[1]	004SB001	0.082	88	NA	NA	NA	NA
	004SB002	69.233			NA		
	004SB003	ND			NA		
	004SB004	ND			NA		
	619SB001	**272.080**			NA		
	619SB002	49.214			NA		
	619SB004	**540.180**			NA		
	619SB005	**163.885**			NA		
	619SB006	**244.205**			NA		
	619SB007	**152.740**			NA		
	619SB008	84.842			NA		
	619SB009	**247.360**			NA		
	619SB010	ND			NA		
	619SB011	**176.360**			NA		
	619SB013	**190.980**			NA		
	619SB014	ND			NA		
	619SB015	**214.770**					

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
2-Methylnaphthalene	004SB001	600.0	310000	NA	ND	126000	NA
	004SB002	45.0			ND		
	619SB002	50.0			NT		
	619SB005	60.0			NT		
	619SB006	435.0			NT		
Acenaphthene	619SB006	340.0	470000	NA	NT	570000*	NA
Acenaphthylene	619SB004	72.0	470000	NA	ND	293000	NA
	619SB015	51.0			ND		
Anthracene	004SB004	ND	2300000	NA	64	12000000*	NA
	619SB001	62			ND		
	619SB004	750			ND		
	619SB007	120			NT		
	619SB009	50			ND		
	619SB013	65			100.0		
	619SB015	48			ND		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Benzo(a)anthracene	004SB001	ND	880	NA	92	2000[b]	NA
	004SB002	53.5			88		
	004SB003	ND			48		
	004SB004	ND			200		
	619SB001	220.0			ND		
	619SB004	600.0			120		
	619SB005	119.5			NT		
	619SB007	92.0			NT		
	619SB008	59.0			NT		
	619SB009	86.0			ND		
	619SB010	ND			100		
	619SB011	120.0			NT		
	619SB013	130.0			180		
	619SB014	ND			82		
	619SB015	120.0			96		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Benzo(a)pyrene	004SB001	ND	88	NA	110.0	8000	NA
	004SB002	56.0			91.0		
	004SB003	ND			57.0		
	004SB004	ND			200.0		
	619SB001	**220.0**			63.0		
	619SB002	43.0			NT		
	619SB004	**410.0**			130.0		
	619SB005	**125.0**			NT		
	619SB006	**240.0**			NT		
	619SB007	**120.0**			NT		
	619SB008	66.0			NT		
	619SB009	**190.0**			ND		
	619SB010	ND			100.0		
	619SB011	**140.0**			NT		
	619SB013	**140.0**			150.0		
	619SB014	ND			92.0		
	619SB015	**170.0**			130.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Benzo(b)fluoranthene	004SB001	ND	880	NA	110.0	5000	NA
	004SB002	72.5			120.0		
	004SB003	ND			52.0		
	004SB004	ND			220.0		
	619SB001	220.0			ND		
	619SB002	57.0			NT		
	619SB004	460.0			240.0		
	619SB005	165.0			NT		
	619SB007	160.0			NT		
	619SB008	69.0			NT		
	619SB009	400.0			70.0		
	619SB010	ND			110.0		
	619SB011	160.0			NT		
	619SB013	270.0			170.0		
	619SB014	ND			120.0		
	619SB015	220.0			130.0		
Benzo(g,h,i)perylene	004SB001	ND	230000	NA	78.0	4.66E+08	NA
	004SB002	60.0			ND		
	004SB004	ND			90.0		
	619SB001	62.0			ND		
	619SB004	200.0			ND		
	619SB005	110.0			NT		
	619SB006	63.0			NT		
	619SB007	62.0			NT		
	619SB008	59.0			NT		
	619SB009	100.0			ND		
	619SB010	ND			67.0		
	619SB011	65.0			NT		
	619SB013	79.0			66.0		
	619SB015	75.0			ND		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Benzo(k)fluoranthene	004SB001	ND	8800	NA	110.0	49000[b]	NA
	004SB002	55.50			94.0		
	004SB003	ND			58.0		
	004SB004	ND			230.0		
	619SB001	220.0			ND		
	619SB002	46.0			NT		
	619SB004	370.0			ND		
	619SB005	120.0			NT		
	619SB007	120.0			NT		
	619SB008	67.0			NT		
	619SB010	ND			110.0		
	619SB011	140.0			NT		
	619SB013	210.0			180.0		
	619SB014	ND			140.0		
	619SB015	200.0			140.0		
Benzoic acid	004SB003	ND	31000000	NA	49.0	400000[b,c]	NA
	004SB004	48.0			ND		
	619SB001	ND			42.0		
	619SB002	97.0			NT		
	619SB004	110.0			110.0		
	619SB005	130.0			NT		
	619SB007	60.0			NT		
	619SB009	130.0			110.0		
	619SB010	ND			62.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
bis(2-Ethylhexyl)phthalate	004SB002	253.50	46000	NA	ND	3600000	NA
	619SB001	85.00			ND		
	619SB004	45.00			ND		
	610SB005	44.00			NT		
	619SB007	60.00			NT		
	619SB008	1400.00			NT		
	619SB011	57.00			NT		
Butylbenzylphthalate	619SB008	42.0	1600000	NA	ND	930000[c]	NA
Chrysene	004SB001	82.0	88000	NA	110.0	160000[b]	NA
	004SB002	78.0			120.0		
	004SB003	ND			59.0		
	004SB004	ND			350.0		
	619SB001	280.0			ND		
	619SB002	54.0			NT		
	619SB004	480.0			130.0		
	619SB005	135.0			NT		
	619SB006	305.0			NT		
	619SB007	140.0			NT		
	619SB008	72.0			NT		
	619SB009	160.0			ND		
	619SB010	ND			110.0		
	619SB011	160.0			NT		
	619SB013	380.0			240.0		
	619SB014	ND			130.0		
	619SB015	170.0			130.0		
Diethylphthate	004SB001	ND	6300000	NA	94	470000[c]	NA
Di-n-butylphthalate	004SB001	200.0	780000	NA	ND	2300000	NA
	619SB004	53.0			ND		
	619SB005	48.0			NT		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Di-n-octylphthalate	619SB008	56.0	160000	NA	NT	10000000[d]	NA
Dibenzofuran	004SB001	41.0	31000	NA	ND	240000	NA
Fluoranthene	004SB001	ND	310000	NA	130	4300000[d]	NA
	004SB002	84			140		
	004SB003	ND			99		
	004SB004	ND			410		
	619SB001	370			ND		
	619SB002	53			NT		
	619SB004	3100			160		
	619SB005	210			NT		
	619SB006	280			NT		
	619SB007	120			NT		
	619SB008	110			NT		
	619SB009	88			64		
	619SB010	ND			200		
	619SB011	150			NT		
	619SB012	ND			58		
	619SB013	890			810		
	619SB014	ND			140		
	619SB015	160			140		
Fluorene	619SB004	110.0	310000	NA	ND	560000[e]	NA
	619SB006	195.0			NT		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Indeno(1,2,3-cd)pyrene	004SB001	ND	880	NA	92	14000[e]	NA
	004SB004	ND			100		
	619SB001	56			ND		
	619SB004	200			ND		
	619SB005	91			NT		
	619SB006	39			NT		
	619SB007	62			NT		
	619SB008	53			NT		
	619SB009	86			ND		
	619SB010	ND			62		
	619SB011	68			NT		
	619SB013	85			65		
	619SB015	86			62		
Naphthalene	004SB001	680.0	310000	NA	ND	84000[e]	NA
Pentachlorophenol	619SB005	74.0	5300	NA	NT	30[e,f]	NA

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Phenanthrene	004SB001	93	230000	NA	ND	1380000	NA
	004SB002	53			61		
	004SB004	ND			85		
	619SB001	120			ND		
	619SB002	52			NT		
	619SB004	1200			83		
	619SB005	180			NT		
	619SB006	490			NT		
	619SB007	54			NT		
	619SB008	89			NT		
	619SB011	55			NT		
	619SB013	280			72		
	619SB014	ND			45		
	619SB015	60			ND		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Pyrene	004SB001	44	230000	NA	120	4200000[a]	NA
	004SB002	89.5			140		
	004SB003	ND			110		
	004SB004	ND			390		
	619SB001	910			ND		
	619SB002	55			NT		
	619SB004	2500			160		
	619SB005	225			NT		
	619SB006	1260			NT		
	619SB007	140			NT		
	619SB008	100			NT		
	619SB009	130			76		
	619SB010	ND			210		
	619SB011	130			NT		
	619SB012	ND			48		
	619SB013	670			670		
	619SB014	ND			150		
	619SB015	180			130		
Pesticides and PCBs (µg/kg)							
4,4'-DDD	004SB001	13.0	2700	NA	ND	16000[b]	NA
	004SB002	7.2			ND		
	619SB005	4.45			NT		
	619SB006	5.05			NT		
	619SB011	110.0			NT		
	619SB013	200.0			16.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
4,4'-DDE	619SB005	11.6	1900	NA	NT	54000[b]	NA
	619SB011	25.0			NT		
	619SB013	530.0			43.0		
	619SB014	ND			3.8		
4,4'-DDT	004SB002	18.0	1900	NA	ND	32000[b]	NA
	619SB005	11.3			NT		
	619SB013	52.0			ND		
Aroclor-1260	004SB002	250.0	320	NA	ND	1000	NA
	004SB004	5.9			ND		
	619SB002	87.0			NT		
	619SB010	19.0			ND		
	619SB011	110.0			NT		
	619SB014	27.0			210.0		
	619SB015	85.0			ND		
Endrin	004SB001	8.4	2300	NA	ND	1000	NA
	619SB011	4.6			NT		
	619SB013	14.0			ND		
Heptachlor	004SB004	ND	140	NA	2.3	2300	NA
Heptachlor epoxide	004SB002	3.1	70	NA	ND	700	NA
	619SB015	2.5			ND		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
alpha-Chlordane	004SB001	2.5	490	NA	ND	10000	NA
	004SB002	19.5			ND		
	619SB004	3.1			ND		
	619SB005	16.0			NT		
	619SB008	8.1			NT		
	619SB011	4.5			NT		
	619SB015	5.8			ND		
gamma-Chlordane	004SB001	4.3	490	NA	ND	10000	NA
	004SB002	54.5			ND		
	619SB003	ND			22.0		
	619SB005	26.0			NT		
	619SB008	10.0			NT		
	619SB011	5.7			NT		
	619SB013	27.0			12.0		
	619SB015	34.0			ND		
Dioxin (ng/kg)							
Dioxin (2,3,7,8-TCDD TEQ')	004SB002	0.5463	1000	NA	ND	1900	NA
	619SB005	0.5039			NT		
	619SB006	2.4560			NT		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Inorganics (mg/kg)							
Aluminum (Al)	004SB001	4460	7800 0	18500	13000	1000000	17100
	004SB002	4510			18800		
	004SB003	4450			24700		
	004SB004	1220			16200		
	619SB001	8400			1840		
	619SB002	7450			NT		
	619SB004	12100			24500		
	619SB005	4720			NT		
	619SB006	2170			NT		
	619SB007	12600			NT		
	619SB008	4480			NT		
	619SB009	5110			24600		
	619SB010	5950			25200		
	619SB011	5570			NT		
	619SB012	751			793		
	619SB013	5300			10700		
	619SB014	5270			11800		
	619SB015	9790			15200		
Antimony (Sb)	004SB002	0.670	3.1	0.79	ND	5	NL
	619SB005	0.530			NT		
	619SB014	ND			0.580		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Arsenic (As)	004SB001	10.500	0.43	19.9	12.2	29[c]	18.2
	004SB002	6.050			23.0		
	004SB003	1.200			28.1		
	004SB004	1.500			12.3		
	619SB001	8.100			1.4		
	619SB002	11.200			NT		
	619SB004	7.600			19.8		
	619SB005	2.900			NT		
	619SB006	1.115			NT		
	619SB007	11.500			NT		
	619SB008	8.900			NT		
	619SB009	3.400			24.3		
	619SB010	2.500			18.2		
	619SB011	8.800			NT		
	619SB012	3.500			2.3		
	619SB013	9.900			11.2		
	619SB014	2.300			10.5		
	619SB015	17.800			18.1		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Barium (Ba)	004SB001	29.3	550.0	61.5	27.1	1600[c]	51.8
	004SB002	18.8			34.2		
	004SB003	4.6			40.2		
	004SB004	4.9			30.5		
	619SB001	51.0			7.8		
	619SB002	35.1			NT		
	619SB004	28.6			39.6		
	619SB005	17.4			NT		
	619SB006	3.9			NT		
	619SB007	28.3			NT		
	619SB008	16.9			NT		
	619SB009	12.8			38.9		
	619SB010	15.3			37.7		
	619SB011	65.6			NT		
	619SB012	7.6			7.2		
	619SB013	41.4			38.7		
	619SB014	4.2			33.2		
	619SB015	50.8			33.9		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[b] (DAF=20)	Subsurface Background
Beryllium (Be)	004SB001	0.410	0.15	1.05	0.92	63[c]	1.20
	004SB002	0.290			13.00		
	004SB003	0.170			1.20		
	004SB004	0.130			0.85		
	619SB001	0.570			0.17		
	619SB002	0.550			NT		
	619SB004	0.530			1.30		
	619SB005	0.265			NT		
	619SB006	0.055			NT		
	619SB007	0.610			NT		
	619SB009	0.240			1.50		
	619SB010	0.290			1.50		
	619SB012	0.280			0.28		
	619SB013	0.500			0.69		
	619SB014	0.580			ND		
	619SB015	0.930			1.20		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Cadmium (Cd)	004SB001	0.210	3.9	0.26	0.26	8[c]	0.09
	004SB002	0.295			0.28		
	004SB003	ND			0.32		
	004SB004	0.080			0.26		
	619SB001	0.480			ND		
	619SB002	0.420			NT		
	619SB004	0.140			0.24		
	619SB005	0.215			NT		
	619SB006	0.050			NT		
	619SB007	0.130			NT		
	619SB008	0.200			NT		
	619SB009	ND			0.20		
	619SB010	0.160			0.27		
	619SB011	0.280			NT		
	619SB012	0.600			0.61		
	619SB013	0.990			0.62		
	619SB014	0.050			0.26		
	619SB015	0.410			0.30		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Calcium (Ca)	004SB001	20400.0	NL	NL	20900.0	NL	NL
	004SB002	14905.0			13700.0		
	004SB003	8410.0			14700.0		
	004SB004	14200.0			11200.0		
	619SB001	15300.0			319.0		
	619SB002	6100.0			NT		
	619SB004	18900.0			12900.0		
	619SB005	12650.0			NT		
	619SB006	801.0			NT		
	619SB007	11500.0			NT		
	619SB008	39700.0			NT		
	619SB009	3510.0			12300.0		
	619SB010	46100.0			9130.0		
	619SB011	32500.0			NT		
	619SB012	312000.0			322000.0		
	619SB013	36000.0			12700.0		
	619SB014	8830.0			12600.0		
	619SB015	10700.0			12800.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Chromium (Cr)	004SB001	10.10	39 VI	34.8	25.20	38[c] (total)	32.2
	004SB002	10.90	7800 III		36.60		
	004SB003	5.90			**38.80**		
	004SB004	3.40			28.10		
	619SB001	17.70			2.70		
	619SB002	20.40			NT		
	619SB004	22.30			**40.40**		
	619SB005	9.25			NT		
	619SB006	3.45			NT		
	619SB007	21.70			NT		
	619SB008	10.60			NT		
	619SB009	8.00			**43.40**		
	619SB010	10.70			**42.80**		
	619SB011	17.10			NT		
	619SB012	4.40			4.20		
	619SB013	20.40			32.60		
	619SB014	6.20			21.00		
	619SB015	22.80			30.40		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Cobalt (Co)	004SB001	2.4	470.0	15.1	4.2	2000	6.85
	004SB002	2.4			6.9		
	004SB003	22.20			6.4		
	004SB004	0.86			5.1		
	619SB001	2.3			ND		
	619SB002	3.8			NT		
	619SB004	2.8			7.6		
	619SB005	1.6			NT		
	619SB007	3.3			NT		
	619SB008	1.7			NT		
	619SB009	1.2			7.8		
	619SB010	5.9			7.8		
	619SB011	2.1			NT		
	619SB012	3.1			3.2		
	619SB013	3.3			4.2		
	619SB014	1.0			3.0		
	619SB015	7.5			5.6		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Copper (Cu)	004SB001	18.7	310.0	48.2	20.00	920	30.4
	004SB002	17.95			26.30		
	004SB003	4.9			26.50		
	004SB004	4.2			19.30		
	619SB001	70.30			ND		
	619SB002	20.00			NT		
	619SB004	13.7			28.40		
	619SB005	17.1			NT		
	619SB006	1.5			NT		
	619SB007	14.3			NT		
	619SB008	15.8			NT		
	619SB009	13.5			29.90		
	619SB010	12.3			32.30		
	619SB011	21.9			NT		
	619SB012	2.1			3.90		
	619SB013	72.8			44.10		
	619SB014	2.8			43.70		
	619SB015	92.40			23.60		
Cyanide (CN)	004SB002	0.170	160	0.29	NT	40	0.24

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Iron (Fe)	004SB001	6470	2300.0	NL	20200	NL	NL
	004SB002	5805			31000		
	004SB003	3080			26200		
	004SB004	1360			19500		
	619SB001	11800			1900		
	619SB002	15000			NT		
	619SB004	14000			33200		
	619SB005	4410			NT		
	619SB006	784			NT		
	619SB007	15500			NT		
	619SB008	6300			NT		
	619SB009	5400			33300		
	619SB010	5240			32100		
	619SB011	7800			NT		
	619SB012	2120			1920		
	619SB013	9360			15200		
	619SB014	1840			13500		
	619SB015	18900			26400		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Lead(Pb)	004SB001	112.0	400.0[d]	180	51.6	400[d]	51.7
	004SB002	57.5			45.7		
	004SB003	3.0			48.1		
	004SB004	6.8			43.1		
	619SB001	197.0			3.7		
	619SB002	58.8			NT		
	619SB004	45.0			54.9		
	619SB005	43.3			NT		
	619SB006	5.7			NT		
	619SB007	32.0			NT		
	619SB008	28.7			NT		
	619SB009	11.5			50.2		
	619SB010	12.8			49.8		
	619SB011	58.7			NT		
	619SB012	1.3			6.4		
	619SB013	126.0			214.0		
	619SB014	7.3			60.8		
	619SB015	113.0			46.5		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Magnesium (Mg)	004SB001	541.00	NL	NL	3050.0	NL	NL
	004SB002	680.00			5290.0		
	004SB003	318.00			4510.0		
	004SB004	293.00			3160.0		
	619SB001	1710.00			187.0		
	619SB002	1260.00			NT		
	619SB004	2740.00			5370.0		
	619SB005	605.00			NT		
	619SB006	110.85			NT		
	619SB007	2440.00			NT		
	619SB008	1130.00			NT		
	619SB009	756.00			5740.0		
	619SB010	1170.00			5950.0		
	619SB011	1260.00			NT		
	619SB012	3420.00			3610.0		
	619SB013	1380 00			2600.0		
	619SB014	194.00			1760.0		
	619SB015	1660.00			4180.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Manganese (Mn)	004SB001	66.7	180.0	307	388.0	1100	469
	004SB002	91.2			701.0		
	004SB003	13.8			286.0		
	004SB004	20.4			227.0		
	619SB001	104.0			8.3		
	619SB002	115.0			NT		
	619SB004	283.0			556.0		
	619SB005	41.6			NT		
	619SB006	9.5			NT		
	619SB007	216.0			NT		
	619SB008	110.0			NT		
	619SB009	54.5			567.0		
	619SB010	81.0			455.0		
	619SB011	150.0			NT		
	619SB012	243.0			234.0		
	610SB013	118.0			181.0		
	610SB014	8.2			140.0		
	610SB015	320.0			474.0		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Mercury (Hg)	004SB001	0.060	2.3	0.62	0.83	2°	0.23
	004SB002	0.055			0.31		
	004SB003	ND			0.51		
	004SB004	0.060			0.23		
	619SB001	ND			1.40		
	619SB002	0.140			NT		
	619SB004	0.160			0.39		
	619SB005	0.065			NT		
	619SB006	0.070			NT		
	619SB007	0.280			NT		
	619SB008	0.180			NT		
	619SB009	0.080			0.24		
	619SB010	0.040			0.34		
	619SB011	0.100			NT		
	619SB013	0.240			0.52		
	619SB014	ND			0.18		
	619SB015	0.230			0.34		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Nickel (Ni)	004SB001	8.30	160.0	12.6	8.0	130[c]	8.85
	004SB002	4.45			11.2		
	004SB003	3 70			13.1		
	004SB004	2.10			10.0		
	619SB001	12.00			1.0		
	619SB002	9.80			NT		
	619SB004	6.40			12.7		
	619SB005	4.80			NT		
	619SB006	0.51			NT		
	619SB007	7.20			NT		
	619SB008	3.90			NT		
	619SB009	2.50			13.8		
	619SB010	5.90			13.2		
	619SB011	5.20			NT		
	619SB012	10.50			12.9		
	619SB013	14.00			12.1		
	619SB014	1.80			7.8		
	619SB015	9.40			9.4		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Potassium (K)	004SB001	ND	NL	NL	1260.0	NL	NL
	004SB002	258.0			2350.0		
	004SB003	ND			2440.0		
	004SB004	ND			1640.0		
	619SB001	761.0			94.5		
	619SB002	639.0			NT		
	619SB004	1100.0			2760.0		
	619SB005	263.5			NT		
	619SB007	1110.0			NT		
	619SB008	353.0			NT		
	619SB009	429.0			3130.0		
	619SB010	500.0			3050.0		
	619SB011	495.0			NT		
	619SB012	485.0			423.0		
	619SB013	620.0			1300.0		
	619SB014	ND			864.0		
	619SB015	767.0			2010.0		
Selenium (Se)	004SB002	0.52	39	1.15	ND	5	1.24
	619SB001	0 64			ND		
	619SB002	0.45			NT		
	619SB004	0.61			1.10		
	619SB007	0.63			NT		
	619SB009	ND			1.30		
	610SB014	ND			0.71		
Silver (Ag)	004SB002	0.24	39	1.85	0.38	34	ND
	619SB006	0.31			NT		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Sodium (Na)	004SB001	ND	NL	NL	693	NL	NL
	004SB002	205			3800		
	004SB003	ND			4130		
	004SB004	ND			2620		
	619SB001	620			390		
	619SB002	281			NT		
	619SB004	1170			5190		
	619SB005	216			NT		
	619SB007	1430			NT		
	619SB008	215			NT		
	619SB009	770			6540		
	619SB010	534			7480		
	619SB011	280			NT		
	619SB013	ND			2500		
	619SB014	121			833		
	619SB015	ND			904		
Thallium (Tl)	619SB007	0.57	0.63	NL	NT	1.24	1.24
	619SB009	ND			1.40		
	619SB013	ND			0.50		
Tin (Sn)	619SB001	12.30	4700	9.38	ND	11000	NL

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC[a] (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL[a] (DAF=20)	Subsurface Background
Vanadium (V)	004SB001	15.40	55.0	48.9	42.1	6000[a]	49.4
	004SB002	11.40			65.2		
	004SB003	6.30			58.7		
	004SB004	3.80			40.0		
	619SB001	24.90			4.1		
	619SB002	30.20			NT		
	619SB004	30.20			67.1		
	619SB005	10.45			NT		
	619SB006	2.65			NT		
	619SB007	31.50			NT		
	619SB008	12.40			NT		
	619SB009	10.50			71.7		
	619SB010	12.10			72.5		
	619SB011	13.30			NT		
	619SB012	6.90			5.6		
	619SB013	20.50			30.7		
	619SB014	5.50			26.6		
	619SB015	28.20			54.8		

Table 10.1.4
Zone F
SWMU 4 and AOC 619
Analytes Detected in Surface and Subsurface Soil

Parameters	Location	Surface Conc.	Residential RBC* (THQ=0.1)	Surface Background	Subsurface Conc.	Soil to Groundwater SSL* (DAF=20)	Subsurface Background
Zinc (Zn)	004SB001	65.0	2300.0	198	86.8	12000[a,c]	84.2
	004SB002	172.5			102.0		
	004SB003	7.8			106.0		
	004SB004	19.5			87.5		
	619SB001	317.0			ND		
	619SB002	123.0			NT		
	619SB004	64.0			118.0		
	619SB005	111.5			NT		
	619SB006	5.4			NT		
	619SB007	65.4			NT		
	619SB008	72.9			NT		
	619SB009	19.3			115.0		
	619SB010	41.6			116.0		
	619SB011	81.2			NT		
	619SB012	19.4			42.2		
	619SB013	258.0			231.0		
	619SB014	11.3			135.0		
	619SB015	663.0			108.0		

Notes:

a	=	Calculated values correspond to a noncancer hazard quotient of 1
b	=	Calculated values correspond to a cancer risk level of 1 in 1,000,000
c	=	SSL for pH of 6.8
d	=	A screening level of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994a)
e	=	Soil saturation concentration (C_{sat})
f	=	Level is at or below contract laboratory program required quantitation limit for regular analytical services (RAS)
*	=	Residential RBCs (THQ=0.1) were used as a reference concentration for upper interval samples. Generic soil to groundwater SSLs (DAF=20) from the *Soil Screening Guidance: Technical Background Document* (USEPA, 1996c) were used as a reference concentration for lower interval samples
l	=	Calculated from methods described in USEPA Interim *Supplemental Guidance to RAGS: Human Health Risk Assessment*, Bulletin 2 (USEPA, 1995b)
ND	=	Not detected
NT	=	Not taken
NL	=	Not listed
NA	=	Not applicable
µg/kg	=	Micrograms per kilogram
mg/kg	=	Milligrams per kilogram

Bolded concentrations exceed both the reference concentration (RBC or SSL) and the zone background.
All background values for Zone F are based on twice the means of the grid sample concentrations. One grid sample from Zone E is included in each group.

Table 10.1.7
Zone F
Analytes Detected in SWMU 4 and AOC 619 Sediment Samples

Parameters	Location	Concentration	AOC 619 SS Range
Volatile Organic Compounds (µg/kg)			
Trichloroethene	619M0001	4.0	2.0
Semivolatile Organic Compounds (µg/kg)			
Benzo(a)anthracene	619M0001	86.0	54-600
Benzo(a)pyrene	619M0001	67.0	43-410
Benzo(b)fluoranthene	619M0001	46.0	57-460
Benzo(g,h,i)perylene	619M0001	56.0	59-200
Benzo(k)fluoranthene	619M0001	72.0	46-370
bis(2-Ethylhexyl)phthalate (BEHP)	619M0001	410.0	44-1400
Chrysene	619M0001	100.0	54-480
Fluoranthene	619M0001	180.0	53-3100
Phenanthrene	619M0001	87.0	52-1200
Pyrene	619M0001	140.0	44-2500
Pesticides (µg/kg)			
4,4'-DDE	619M0001	6.70	11.6-530
4,4'-DDT	619M0001	7.60	11.3-52
Endrin aldehyde	619M0001	7.40	4.6-14 (Endr
alpha-Chlordane	619M0001	2.40	2.5-19.5
Inorganics (mg/kg)	Residential RBC / SS BRC		SS range
Aluminum (Al)	619M0001	18,500 / 2070.00	751-12,600
Arsenic (As)	619M0001	19.9 / 3.40	1.12-17.8
Barium (Ba)	619M0001	61.5 / 22.70	3.9-65.6
Cadmium (Cd)	619M0001	0.26 / 0.31	0.05-0.9
Calcium (Ca)	619M0001	— / 56500.00	801-312,0
Chromium (Cr)	619M0001	34.8 / 12.00	3.4-22.8
Cyanide (CN) 160	619M0001	0.29 / 0.31	0.17
Iron (Fe)	619M0001	23000 / 5400.00	780-18,9

Table 10.1.7
Zone F
Analytes Detected in SWMU 4 and AOC 619 Sediment Samples

Parameters	Location	SS BRC	Concentration	SS Range
Lead(Pb)	619M0001	180	24.10	1.3 - 197
Magnesium (Mg)	619M0001	-	1440.00	111 - 3420
Manganese (Mn)	619M0001	307	105.00	8.2 - 320
Nickel (Ni)	619M0001	12.6	6.00	0.52 - 14
Potassium (K)	619M0001	-	276.00	258 - 1110
Vanadium (V)	619M0001	98.9	6.40	2.65 - 31.5
Zinc (Zn)	619M0001	198	563.00	5.4 - 663

Notes:
NA = Not available
ND = Not detected
NT = Not taken
mg\kg = Milligrams per kilogram

Volatile Organic Compounds in Sediment

TCE was the only VOC detected in the sediment. It was also detected in onsite surface and subsurface soil samples.

Semivolatile Organic Compounds in Sediment

Ten semivolatile compounds were detected in the sediment samples. Concentrations of all ten benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, phenanthrene and pyrene, were detected in both onsite soil and sediment.

Pesticides and PCBs in Sediment

Four pesticides were detected in the sediment sample. Concentrations of 4,4'-DDE, 4,4'-DDT, and alpha-chlordane were present in sediment and soil samples. No PCBs were detected in the sediment sample.

Table 10.1.11
Zone F
SWMU 4 and AOC 619
Analytes Detected in Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Volatile Organic Compounds (µg/L)							
Chloromethane	619003	8.0	ND	ND	1.4	NL	NA
Semivolatile Organic Compounds (µg/L)							
2-Methylnaphthalene	619003	3.0	ND	1.0	150	NL	NA
4-Methylphenol (p-Cresol)	619002	1.0	ND	ND			
	619003	6.0	ND	ND	18	NL	NA
Acenaphthene	619003	2.0	ND	1.0	220	NL	NA
Benzoic Acid	619002	2.0	ND	5.0	15000	NL	NA
Dibenzofuran	619003	2.0	ND	1.0	15	NL	NA
Fluorene	619003	4.0	ND	2.0	150	NL	NA
Naphthalene	619003	2.0	1.0	1.0	150	NL	NA
Phenanthrene	619003	2.0	ND	ND	150	NL	NA
Inorganics (µg/L)							
Aluminum (Al)	619001	523.0	ND	ND	3700	50	224
	619002	105.0	66.70	311			
	619003	233.0	10.30	189			
Antimony (Sb)	619002	ND	3.2	4.9	1.5	6	NL
	619003	ND	4.9	ND			

Table 10.1.11
Zone F
SWMU 4 and AOC 619
Analytes Detected in Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Arsenic (As)	619001	ND	ND	9.8	0.045	50	16.7
	619002	6.5	4.9	5.4			
	619003	3.0	8.0	3.8			
Barium (Ba)	619001	24.6	ND	17.8	260	2000	94.3
	619002	18.2	18.0	22.6			
	619003	92.2	69.2	49.3			
Beryllium (Be)	619003	ND	0.3900	ND	0.016	4	0.66
Calcium (Ca)	619001	9450.0	14900.0	14000	NL	NL	NL
	619002	66200.0	64200.0	62400			
	619003	205000.0	200000.0	76500			
Chromium (Cr)	619001	1.0	ND	ND	18	100	2.05
	619002	2.3	1.0	1.9			
	619003	1.0	1.5	1.4			
Cobalt (Co)	619001	ND	ND	1.6	220	NL	10.9
	619003	ND	1.4	ND			
Copper (Cu)	619001	ND	4.2	ND	150	1000	NL
	619003	ND	ND	3.6			
Iron (Fe)	619001	3040.0	1190.0	4620	1100	300	NL
	619002	4490.0	3270.0	2420			
	619003	32000.0	17000.0	3330			
Lead (Pb)	619002	ND	0.940	ND	15	15	NL

Table 10.1.11
Zone F
SWMU 4 and AOC 619
Analytes Detected in Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Magnesium (Mg)	619001	8480.0	4140.0	5980	NL	NL	NL
	619002	35400.0	15100.0	18300			
	619003	356000.0	497000.0	122000			
Manganese (Mn)	619001	61.2	22.0	56	84	50	2010
	619002	243.0	264.0	215			
	619003	1420.0	702.0	314			
Mercury (Hg)	619001	ND	ND	0.11	1.1	2	NL
	619002	ND	ND	0.17			
Nickel (Ni)	619002	ND	1.5	ND	73	100	5.55
	619003	ND	1.5	ND			
Potassium (K)	619001	3230.0	3840.0	3800	NL	NL	NL
	619002	45600.0	16200.0	23600			
	619003	163000.0	158000.0	46400			
Sodium (Na)	619001	262000.0	134000.0	182000	NL	NL	NL
	619002	689000.0	234000.0	346000			
	619003	3840000.0	4600000.0	1240000			
Thallium (Tl)	619001	3.4	6.8	1.2	0.29	2	5.58
	619003	6.6	ND	ND			
Vanadium (V)	619001	1.6	ND	ND	26	NL	1.58
	619002	5.1	2.3	3.2			
	619003	ND	7.5	9.4			

Table 10.1.11
Zone F
SWMU 4 and AOC 619
Analytes Detected in Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
pH							
pH	619001	NT	5.750	NT			

Notes:
NL = Not listed
ND = Not detected
NA = Not applicable
NT = Not taken
* = Tap Water RBCs (THQ=0.1) from *Risk-based Concentration Table, January-June 1996* (USEPA, 1996b). MCLs/SMCLs from *Drinking Water Regulatins and Health Advisories* (USEPA, 1996e), were used as reference concentrations

Bolded concentrations exceed both the RBC and the zone background.
All background values for Zone F are based on twice the means of the grid sample concentrations. One grid sample from Zone E is included in each group. Background values for groundwater are based on two sampling rounds in two wells at each depth.

For inorganics, maximum concentrations in soil are compared to the greater of (a) risk-based soil screening levels, or (b) background concentrations. To provide a conservative screen, generic soil screening levels are used; leachate entering the aquifer is assumed to be diluted by a ratio of 20:1, with no attenuation of constituents in soil (DAF=20).

One organic compound - pentachlorophenol (PCP) - was detected in surface soil exceeding its SSL. Three additional organic compounds — benzene, methylene chloride, and TCE - were detected in subsurface soil at concentrations exceeding their SSL. Importantly, PCP was not detected in subsurface soil or shallow groundwater samples. Methylene chloride, TCE, and benzene were not detected in any of the three groundwater samples. Benzene and TCE screens were exceeded in the same sample, 619SB001, the methylene chloride screen was exceeded in only one location 619SB004) and PCP was exceeded in only one location 619SB005. Ten volatile organic species were detected in site soil, and without exception they all exhibited an enrichment with depth. In addition to the organic compounds present above their screening levels, a number of other semivolatile compounds, pesticides and PCBs, and dioxin were detected in site soil samples. Generally these detected species exhibited marked depletion with depth. The nature of contamination detected is consistent with past site activities. The vertical distribution of volatiles is counter-intuitive enigmatic, and suggests their occurrence is a relict of a past release(s) in which volatilization has purged surface soil horizons of these constituents; their absence in groundwater indicates that volatilization from this media as a source for soil contamination is not probable. The lateral distribution of volatile and exceedances is indicative of very little residual mass remaining that poses a potential threat to groundwater, and the lack of soil-detected species in groundwater verifies this. The vertical distribution of the other detected organic species is consistent with their characteristically high affinities for attenuation through soil media adsorption, and their absence to low concentrations in groundwater proves that they pose no threat to groundwater.

Table 10.1.12
Chemicals Detected in Surface Soil, Subsurface Soil, and Shallow Groundwater
Comparison to SSLs, Tap Water RBCs, Salt Water Surface Water Chronic Screening Levels, and Background Concentrations
NAVBASE Charleston, Zone F: SWMU 4 and AOC 619
Charleston, South Carolina

Parameter	Max. Concentration		Max. Concentration		Screening Concentration *							
	Surface Soil	Subsurface Soil	Shallow GW	Deep GW	Soil to GW SSL	Tap Water RBC	Saltwater Surf. Wtr. Chronic	Soil Units	Water Units	Leaching Potential	Ground-Water Migration Concern	Surface Water Migration Concern
Volatile Organic Compounds												
Benzene	ND	62	ND	NA	30	0.36	109	UG/KG	UG/L	YES	NO	NO
2-Butanone (MEK)	7	46	ND	NA	7900	1900	NA	UG/KG	UG/L	NO	NO	NO
Carbon disulfide	7	15	ND	NA	32000	1000	NA	UG/KG	UG/L	NO	NO	NO
Chlorobenzene	ND	64	ND	NA	1000	39	105	UG/KG	UG/L	NO	NO	NO
Chloroform	ND	2	ND	NA	600	0.15	815	UG/KG	UG/L	NO	NO	NO
Chloromethane	ND	ND	8	NA	6.6	1.4	NA	UG/KG	UG/L	NO	YES	NO
1,1-Dichloroethene	ND	44	ND	NA	60	0.044	2240	UG/KG	UG/L	NO	NO	NO
1,2-Dichloroethene (total)	ND	2	ND	NA	400	55	NA	UG/KG	UG/L	NO	NO	NO
Methylene chloride	6	98	ND	NA	20	4.1	2560	UG/KG	UG/L	YES	NO	NO
Toluene	ND	61	ND	NA	12000	750	37	UG/KG	UG/L	NO	NO	NO
Trichloroethene	2	62	ND	NA	60	1.6	NA	UG/KG	UG/L	YES	NO	NO
Semivolatile Organic Compounds												
Acenaphthene	340	ND	2	NA	570000	2200	9.7	UG/KG	UG/L	NO	NO	NO
Acenaphthylene	72	ND	ND	NA	293000	1500	NA	UG/KG	UG/L	NO	NO	NO
Anthracene	750	100	ND	NA	12000000	11000	NA	UG/KG	UG/L	NO	NO	NO
Benzoic acid	130	110	2	NA	400000	150000	NA	UG/KG	UG/L	NO	NO	NO
Benzo(g,h,i)perylene	200	90	ND	NA	4.66E+08	1500	NA	UG/KG	UG/L	NO	NO	NO
Benzo(a)pyrene equivalents												
Benzo(a)anthracene	600	200	ND	NA	2000	0.092	NA	UG/KG	UG/L	NO	NO	NO
Benzo(a)pyrene	410	200	ND	NA	8000	0.0092	NA	UG/KG	UG/L	NO	NO	NO
Benzo(b)fluoranthene	460	240	ND	NA	5000	0.092	NA	UG/KG	UG/L	NO	NO	NO
Benzo(k)fluoranthene	370	230	ND	NA	49000	0.92	NA	UG/KG	UG/L	NO	NO	NO
Chrysene	480	350	ND	NA	160000	9.2	NA	UG/KG	UG/L	NO	NO	NO
Indeno(1,2,3-cd)pyrene	200	100	ND	NA	14000	0.092	NA	UG/KG	UG/L	NO	NO	NO
Butylbenzylphthalate	42	ND	ND	NA	930000	7300	29.4	UG/KG	UG/L	NO	NO	?
Dibenzofuran	41	ND	2	NA	240000	150	NA	UG/KG	UG/L	NO	NO	NO
Di-n-butylphthalate	200	ND	ND	NA	2300000	3700	3.4	UG/KG	UG/L	NO	NO	NO
Diethylphthalate	94	ND	ND	NA	470000	29000	75.9	UG/KG	UG/L	NO	NO	NO
Di-n-octylphthalate	56	ND	ND	NA	10000000	730	NA	UG/KG	UG/L	NO	NO	NO
bis(2-Ethylhexyl)phthalate (BEHP)	1400	ND	ND	NA	3600000	4.8	NA	UG/KG	UG/L	NO	NO	NO
Fluoranthene	3100	810	ND	NA	4300000	1500	1.6	UG/KG	UG/L	NO	NO	NO
Fluorene	195	ND	4	NA	560000	1500	NA	UG/KG	UG/L	NO	NO	NO
2-Methylnaphthalene	600	ND	3	NA	126000	1500	NA	UG/KG	UG/L	NO	NO	NO
4-Methylphenol (p-cresol)	ND	ND	6	NA	1380	180	NA	UG/KG	UG/L	NO	NO	NO
Naphthalene	680	ND	2	NA	84000	1500	23.5	UG/KG	UG/L	NO	NO	NO
Pentachlorophenol	74	ND	ND	NA	30	0.56	7.9	UG/KG	UG/L	YES	NO	NO
Phenanthrene	1200	85	2	NA	1380000	1500	NA	UG/KG	UG/L	NO	NO	NO
Pyrene	2500	670	ND	NA	4200000	1100	NA	UG/KG	UG/L	NO	NO	NO
Pesticides/PCB Compounds												
Aroclor-1260	250	210	ND	NA	1000	0.033	0.03	UG/KG	UG/L	NO	NO	NO
alpha-Chlordane	19.5	ND	ND	NA	10000	0.052	0.004	UG/KG	UG/L	NO	NO	NO
gamma-Chlordane	54.5	22	ND	NA	10000	0.052	0.004	UG/KG	UG/L	NO	NO	NO
4,4'-DDD	200	16	ND	NA	16000	0.28	0.025	UG/KG	UG/L	NO	NO	NO
4,4'-DDE	530	43	ND	NA	54000	0.2	0.14	UG/KG	UG/L	NO	NO	NO
4,4'-DDT	52	ND	ND	NA	32000	0.2	0.001	UG/KG	UG/L	NO	NO	NO
Endrin	14	ND	ND	NA	1000	11	0.0023	UG/KG	UG/L	NO	NO	NO
Heptachlor	ND	2.3	ND	NA	23000	0.0023	0.0036	UG/KG	UG/L	NO	NO	NO
Heptachlor epoxide	3.1	ND	ND	NA	700	0.0012	0.0036	UG/KG	UG/L	NO	NO	NO
Dioxin Compounds												
Dioxin (TCDD TEQ)	2.46	NA	NA	NA	1900	0.43	10	NG/KG	PG/L	NO	NO	NO
Inorganic Compounds												
Aluminum	12600	25200	523	NA	1000000	37000	NA	MG/KG	UG/L	NO	NO	NO
Antimony	0.67	0.58	ND	NA	5	15	NA	MG/KG	UG/L	NO	NO	?
Arsenic	17.8	28.1	6.5	NA	29	16.7	36	MG/KG	UG/L	NO	NO	NO
Barium	65.6	40.2	92.2	NA	1600	2600	NA	MG/KG	UG/L	NO	NO	NO

Table 10.1.12
Chemicals Detected in Surface Soil, Subsurface Soil, and Shallow Groundwater
Comparison to SSLs, Tap Water RBCs, Salt Water Surface Water Chronic Screening Levels, and Background Concentrations
NAVBASE Charleston, Zone F: SWMU 4 and AOC 619
Charleston, South Carolina

Parameter	Max. Concentration		Max. Concentration		Screening Concentration *							
	Surface Soil	Subsurface Soil	Shallow GW	Deep GW	Soil to GW SSL	Tap Water RBC	Saltwater Surf. Wtr. Chronic	Soil Units	Water Units	Leaching Potential	Ground-Water Migration Concern	Surface Water Migration Concern
Beryllium	0.93	1.5	ND	NA	63	0.66	NA	MG/KG	UG/L	NO	NO	NO
Cadmium	0.99	0.62	ND	NA	8	18	9.3	MG/KG	UG/L	NO	NO	NO
Chromium (total)	22.8	43.4	2.3	NA	38	180	50	MG/KG	UG/L	YES	NO	NO
Cobalt	22.2	7.8	ND	NA	2000	2200	NA	MG/KG	UG/L	NO	NO	NO
Copper	92.4	44.1	ND	NA	920	1500	2.9	MG/KG	UG/L	NO	NO	NO
Cyanide	0.17	ND	NA	NA	40	730	4.3	MG/KG	UG/L	NO	NO	NO
Lead	197	214	ND	NA	400	15	8.5	MG/KG	UG/L	NO	NO	NO
Manganese	320	701	1420	NA	1100	2010	NA	MG/KG	UG/L	NO	NO	NO
Mercury	0.28	1.4	ND	NA	2	11	0.025	MG/KG	UG/L	NO	NO	NO
Nickel	14	13.8	ND	NA	130	730	61.1	MG/KG	UG/L	NO	NO	NO
Selenium	0.64	1.3	ND	NA	5	180	71	MG/KG	UG/L	NO	NO	NO
Silver	0.31	0.38	ND	NA	34	180	2.7	MG/KG	UG/L	NO	NO	NO
Thallium	0.57	1.4	6.6	NA	1.24	2.9	21.3	MG/KG	UG/L	YES	YES	NO
Tin	12.3	ND	ND	NA	11000	22000	NA	MG/KG	UG/L	NO	NO	NO
Vanadium	31.5	72.5	5.1	NA	6000	260	NA	MG/KG	UG/L	NO	NO	NO
Zinc	663	231	ND	NA	12000	11000	86	MG/KG	UG/L	NO	NO	NO

* Screening Concentrations:
Soil to GW - Generic SSLs based on DAF = 20, from 1996 Soil Screening Guidance or calculated using values from Table 6.4
Tap Water RBC - From EPA Region III Risk-Based Concentration Table, June 3, 1996
Saltwater Surface Water Chronic - From EPA Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment, November 1995; Table 2
For inorganics, the value shown is the greater of the relevant screening value or the corresponding background reference value

NA - Not available/Not applicable
ND - Not detected
DAF - Dilution and attenuation factor
RBC - Risk based concentration
SSL - Soil screening level
MG/KG - Milligrams per kilogram
NG/KG - Nanograms per kilogram
PG/L - Picograms per liter
UG/KG - Micrograms per kilogram
UG/L - Micrograms per liter

Two inorganics - chromium and thallium - were present in subsurface soil at concentrations exceeding their SSLs. These species wee also present in surface soil, at lesser concentrations. Chromium was exceeded at four locations (004SB003, 619SB004, 619SB009, 619SB010), while thallium was exceeded at only one (619SB009). Several other inorganic species exhibited increased concentrations with depth. The chromium and thallium detections may be associated with past site activities. Additionally, their vertical distribution is inconsistent with surface releases as a provenance. However, given that indigenous and "fill"subsurface soil is very heterogenous, consideration should be given that these may represent ambient concentrations and may not be related to site activities. Chromium concentrations do not appear to pose a risk to groundwater through leaching, as no chromium exceedances in groundwater were present. Thallium, however, is present above screening levels in groundwater, but only slightly. Overall, the data provide that the soil to groundwater pathway is not expected to result in significant risk to human health or the environment.

10.1.6.3 Groundwater-to-Surface Water Cross-Media Transport

Table 10.1.12 also compares maximum detected organic constituent concentrations in shallow groundwater samples to risk-based concentrations for drinking water, and to chronic ambient saltwater quality criteria values for the protection of aquatic life (saltwater surface water chronic screening values). For inorganics, maximum concentrations in groundwater are compared to the greater of (a) risk-based drinking water concentrations, or (b) background concentrations for groundwater, as well as to the saltwater/surface water chronic values. To provide a conservative screen, no attenuation or dilution of constituents in groundwater is assumed before comparison to the relevant standards.

Only one organic compound — chloromethane - was detected in groundwater at concentrations only slightly above its tap water RBC, and it did not exceed the salt water screening criteria. This exceedance was only present at one location (619SB003), which is downgradient of the general

site area. This constituent is conceivably remotely associated with past site activities. However, this constituent was not detected in the colocated site soil samples, so a clear link between soil and groundwater is absent, effectively eliminating this site as a source for this exceedance. Only one inorganic - thallium - was detected in groundwater very slightly above its RBC; and it did not exceed the saltwater screening criteria. As previously discussed, the source of thallium is unclear, and cannot be linked directly to this site. Overall, the clear lack of source attribution, the general low concentrations of exceedances, and the limited lateral presistence of exceeding constituents provide that the groundwater migration pathway is insignificant at this site. In addition, and most importantly, the risk-based pathway from this site is invalid due to non-use of the resource. As for migration to surface water, no constituents were detected at deleterious concentrations; an additional factor is that the migration pathway to the nearest surface water (Cooper River, 1100 feet northeast of this site) is invalid through the inconsistency between local flow directions and the location of the River.

10.1.6.4 Soil-to-Sediment Cross Media Transport

One sediment sample was collected from a stormwater catch basin that drains the dock area of Building 1824. Table 10.1.7 summarizes the analytes detected in the sediment sample. The only VOC found in common between the surface soil and sediment was TCE. Ten SVOCs and three pesticides were also detected in the surface soil and sediment sample. For inorganics, many of the constituents detected in soil samples were also detected in sediment samples at the site. Of 25 species present in surface soil, 15 were also detected in sediment. This relationship establishes a link between surface soil and sediment, and implies either that surface soil is a source of these constituents in sediment, or at least contributes to the sediment load present in the stormwater drainage system.

10.1.6.5 Soil-to-Air Cross-Media Transport

Table 10.1.13 lists the VOCs detected in surface soil samples collected at this site along with corresponding soil-to-air volatilization screening levels. Little or no surface soil is exposed at SWMU 4/AOC 619. In addition, none of the VOCs was reported at a maximum concentration exceeding its corresponding soil-to-air volatilization screening level. As a result, the soil-to-air migration pathway is not valid at SWMU 4 and AOC 619.

10.1.6.6 Fate and Transport Summary

Three volatiles and one semivolatile were present in site soil at concentrations above their SSLs. Additionally, a number of other organics (volatiles, semivolatiles, pesticide/PCBs, and dioxin) were present in site soil. The vertical distribution of volatiles suggest association with old release(s) in which purging of surface soil has occurred, while the vertical distribution of other organics is consistent with their adsorption and demobilization in surface soil horizons. Only two inorganics, chromium and thallium, were present in site subsurface soil at levels exceeding SSLs, they both were present at lesser concentrations in surface soil. The vertical distribution of these is inconsistent with the site as a provenence, and may be related to ambient subsurface concentrations. One volatile (chloromethane) and one inorganic (thallium) were present in groundwater above RBCs, and both were below their saltwater screening criteria. Neither of these exceedances can be linked empirically to the site as a provenance, and neither is laterally persistent. The risk-based groundwater migration pathway is invalid due to non-use of the resource, and the surface water migration pathway is invalid due to an absence of screening exceedances and inconsistency between groundwater flow directions and the location of the Cooper River. The soil-to-air pathway is invalid at this site due to an absence of screening exceedances.

Table 10.1.13
Soil to Air Volatilization Screening Analysis
NAVBASE Charleston, Zone F: SWMU 4 and AOC 619
Charleston, South Carolina

VOCs	Maximum Concentration in Surface Soil	Soil to Air SSL*	Units	Exceeds SSL
2-Butanone (MEK)	7	10000	UG/KG	NO
Carbon disulfide	7	720000	UG/KG	NO
Methylene chloride	6	13000	UG/KG	NO
Trichloroethene	2	5000	UG/KG	NO

* - Soil screening levels for transfers from soil to air were obtained from USEPA Soil Screening Guidance, Technical Background Document Appendix A, May 1996 (first preference) or from Soil Screening Levels - Transfers from Soil to Air, USEPA Region III Risk-Based Concentration Table, June 1996. Value for 2-Butanone was estimated.

NA - Not available

Table 10.1.26
Summary of Risk and Hazard-based COCs
SWMU 4 and AOC 619
Naval Base Charleston, Zone F
Charleston, South Carolina

Medium	Exposure Pathway		Future Resident Adult Hazard Quotient	Future Resident Child Hazard Quotient	Future Resident Iwa ILCR	Future Site Worker Hazard Quotient	Future Site Worker ILCR	Identification of COCs
Surface Soil	Incidental Ingestion	**Inorganics**						
		Manganese (Mn)	0.0057	0.054	ND	0.0021	ND	
		Semivolatile Organics						
		Benzo(a)pyrene equivalents	ND	ND	2.3E-06	ND	2.5E-07	2
	Dermal	**Inorganics**						
		Manganese (Mn)	0.0012	0.0039	ND	0.00084	ND	
		Semivolatile Organics						
		Benzo(a)pyrene equivalents	ND	ND	1.0E-06	ND	4.1E-07	2
Surface Soil Pathway Sum			0.007	0.06	3E-06	0.003	7E-07	
Groundwater	Ingestion	**Inorganics**						
		Thallium (Tl)	2.3	5.3	ND	0.81	ND	1
		Volatile Organics						
		Chloromethane	ND	ND	1.6E-06	ND	5.0E-07	2
	Inhalation	**Volatile Organics**						
		Chloromethane	ND	ND	7.6E-07	ND	2.4E-07	
Groundwater Pathway Sum			2	5	2E-06	0.8	7E-07	
Sum of All Pathways			2	5	6E-06	0.8	1E-06	

Notes:
ND indicates not determined due to the lack of available risk information.
ILCR indicates incremental excess lifetime cancer risk
HI indicates hazard index
1- Chemical is a COC by virtue of projected child residence noncarcinogenic hazard.
2- Chemical is a COC by virtue of projected future resident lifetime ILCR.
3- Chemical is a COC by virtue of projected site worker noncarcinogenic hazard.
4- Chemical is a COC by virtue of projected site worker ILCR.

Table 10.2.8
Zone F
SWMU 36 and AOC 620
Analytes Detected in Shallow Groundwater

Note. No VOCs detected

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Semivolatile Organic Compounds (µg/L)							
4-Chloro-3-methylphenol	620003	NI	NT	1.0	NL	NL	NA
4-Methylphenol	620001	ND	2.0	ND	18	NL	NA
Acenaphthene	620003	NI	NT	2.0	220	NL	NA
Benzoic Acid	620001	2.0	1.0	5.0	15000	NL	NA
	620002	3.0	ND	5.0			
	620003	NI	NT	4.0			
	620004	NI	NT	4.0			
Diethylphthalate	620001	ND	ND	1.0	2900	NL	NA
	620002	ND	ND	2.0			
Fluorene	620001	1.0	ND	ND	150	NL	NA
Inorganics (µg/L)							
Aluminum (Al)	620001	133	69	99.5	3700	50	224
	620002	62.3	10.2	ND			
	620003	NI	ND	182			
	620004	NI	173	539			
Antimony (Sb)	620001	ND	3.3	ND	1.5	6	NL
	620002	ND	2.1	ND			
Arsenic (As)	620001	9.6	8.0	3.8	0.045	50	16.7
	620002	7.0	ND	4.9			
	620003	NI	ND	11.1			
	620004	NI	5.3	7.7			

Table 10.2.8
Zone F
SWMU 36 and AOC 620
Analytes Detected in Shallow Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Inorganics (µg/L)							
Barium (Ba)	620001	460	525	701	260	2000	94.3
	620002	18.3	31.2	42.3			
	620003	NI	32.9	67.2			
	620004	NI	21.0	55.5			
Beryllium (Be)	620001	ND	0.28	0.85	0.016	4	0.66
	620002	ND	0.39	ND			
	620004	NI	ND	0.3			
Cadmium (Cd)	620003	NI	0.30	ND	1.8	5	0.82
	620004	NI	0.31	ND			
Calcium (Ca)	620001	128000	126000	132000	NL	NL	NL
	620002	74900	147000	152000			
	620003	NI	129000	134000			
	620004	NI	74000	117000			
Chromium (Cr)	620001	2.2	4.9	7.2	18	100	2.05
	620002	ND	ND	1.2			
	620003	NI	ND	1.4			
	620004	NI	ND	3.7			
Cobalt (Co)	620001	ND	1.3	1.6	220	NL	10.9
	620004	NI	1.5	2.4			
Copper (Cu)	620001	ND	2.0	ND	150	1000	NL
	620003	NI	2.5	ND			

Table 10.2.8
Zone F
SWMU 36 and AOC 620
Analytes Detected in Shallow Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Inorganics (µg/L)							
Iron (Fe)	620001	6440	15000	8780	1100	300	NL
	620002	1850	134	2830			
	620003	NI	6880	11700			
	620004	NI	1920	15300			
Lead (Pb)	620001	4.6	ND	ND	15	15	NL
	620004	NI	30.7	ND			
Magnesium (Mg)	620001	359000	423000	388000	NL	NL	NL
	620002	6200	6450	7910			
	620003	NI	231000	18800			
	620004	NI	17400	338000			
Manganese (Mn)	620001	286	214	193	84	50	2010
	620002	208	157	208			
	620003	NI	749	604			
	620004	NI	613	477			
Nickel (Ni)	620001	ND	3.8	3.4	73	100	5.55
	620002	ND	ND	1.4			
	620004	NI	3.7	ND			
Potassium (K)	620001	169000	137000	162000	NL	NL	NL
	620002	7070	14200	14400			
	620003	NI	16800	19200			
	620004	NI	13000	140000			
Selenium (Se)	620002	ND	3.7	ND	18	50	NL
Silver (Ag)	620004	NI	ND	1.5	18	100	NL

Table 10.2.8
Zone F
SWMU 36 and AOC 620
Analytes Detected in Shallow Groundwater

Parameters	Location	1st Quarter Conc.	2nd Quarter Conc.	3rd Quarter Conc.	Tap Water RBC* (µg/L)	MCL/SMCL* (µg/L)	Shallow Background
Inorganics (µg/L)							
Sodium (Na)	620001	3460000	3550000	4630000	NL	NL	NL
	620002	40900	31100	25500			
	620003	NI	75900	71400			
	620004	NI	169000	3400000			
Thallium (Tl)	620001	11.0	ND	ND	0.29	2	5.58
	620002	2.8	ND	ND			
	620003	NI	5.2	ND			
Vanadium (V)	620001	13.9	7.1	8.2	26	NL	1.58
	620002	1.1	ND	ND			
	620004	NI	2.6	9.2			
Zinc (Zn)	620001	ND	ND	13.4	1100	5000	NL
pH							
pH	620003	NI	7.02	NT	NL	NL	NL
	620004	NI	6.95	NT			

Notes:
NL = Not listed
NA = Not applicable
NI = Not installed until April/May
NT = Not taken
µg/L = Micrograms per liter
* = Tap water RBCs (THQ=0.1) from *Risk-Based Concentration Table, January-June 1996* (USEPA, 1996b). MCLs/SMCLs from *Drinking Water Regulations and Health Advisories* (USEPA, 1996e) were used as reference concentrations.
Bolded concentrations exceed both the RBC and the zone background.
All background values for Zone F are based on twice the means of the grid sample concentrations. One grid sample from Zone E is included in each group. Background values for groundwater are based on two sampling rounds in two wells at each depth.
Wells 62003 and 62004 were installed during the second-round and are included in calculations for this table
Data presented are from the initial sampling event only

APPENDIX B

Analytical Data from Additional Sampling

Charleston Naval Complex
SWMU 4/AOC 619, Zone F

SOIL CYANIDE SPLP	StationID	F619SB001		F619SB001		F619SB004		F619SB004	
	SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB004S1 (0-1ft)		619SB004S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/28/1999		10/26/1999		10/28/1999		10/28/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Cyanide, SPLP	mg/L	0.01	U	0.01	U	0.01	U	0.01	U

Charleston Naval Complex
SWMU 4/AOC 619, Zone F

SOIL CYANIDE SPLP	StationID	F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/28/1999		10/28/1999	
	SDGNumber	EN020		EN020	
Parameter	**Units**				
Cyanide, SPLP	mg/L	0.01	U	0.01	U

Charleston Naval Complex
AOC 619, Zone F

Soil Cyanide

	StationID	F619SB001		F619SB001		F619SB004		F619SB004	
	SampleID	619SB001T1 (0-1ft)		619SB001T2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/27/1999		10/27/1999		10/27/1999		10/27/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Cyanide	mg/kg	0.5	U	0.5	U	0.5	U	0.6	U

Soil Cyanide

	StationID	F619SB015		F619SB015	
	SampleID	619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999	
	DateAnalyzed	10/27/1999		10/27/1999	
	SDGNumber	EN020		EN020	
Parameter	**Units**				
Cyanide	mg/kg	0.6	U	0.6	U

Charleston Naval Complex
AOC 619, Zone F

Soil General Chemical	StationID	F619SB001		F619SB001		F619SB004	
	SampleID	619SB001T1 (0-1ft)		619SB001T2 (3-5ft)		619SB004T1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/26/1999		10/26/1999		10/26/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	Units						
Total Organic Carbon	%, DR	9.6	=	0.27	=	0.98	=

Charleston Naval Complex
AOC 619, Zone F

Soil General Chemical	StationID	F619SB004		F619SB015		F619SB015	
	SampleID	619SB004T2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/26/1999		10/26/1999		10/28/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	**Units**						
Total Organic Carbon	%, DR	0.55	=	1.8	=	1.2	=

Soil Metals

	StationID	F619SB001		F619SB001		F619SB001		F619SB001	
	SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/20/1999		10/20/1999		10/29/1999		10/29/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aluminum, SPLP	ug/L	7760	=	415	=				
Antimony, SPLP	ug/L	3.4	J	5.3	J				
Arsenic,SPLP	ug/L	6.5	J	2	U				
Barium, SPLP	ug/L	765	=	481	=				
Beryllium, SPLP	ug/L	0.9	U	1	J				
Cadmium, SPLP	ug/L	0.3	UJ	0.3	UJ				
Calcium, SPLP	ug/L	10800	=	2330	J				
Cobalt, SPLP	ug/L	0.7	J	0.5	U				
Copper, SPLP	ug/L	6.8	J	2.8	J				
Iron, SPLP	ug/L	7420	J	378	J				
Lead, SPLP	ug/L	17.7	=	3 1	J				
Magnesium, SPLP	ug/L	2710	J	622	J				
Manganese, SPLP	ug/L	19 5	=	6 3	J				
Mercury, SPLP	ug/L	0.4	U	0.4	U				
Nickel, SPLP	ug/L	5 5	J	2.5	J				
Potassium, SPLP	ug/L	2220	J	430	J				
Selenium, SPLP	ug/L	2.5	J	1.7	U				
Silver, SPLP	ug/L	1	J	0.5	UJ				
Sodium, SPLP	ug/L	11400	=	3370	J				
Thallium, SPLP	ug/L	2.4	U	2.4	U				
Tin (Sn), SPLP	ug/L	3.7	J	3.2	J				
Vanadium, SPLP	ug/L	19.9	J	3.7	J				
Aluminum	mg/kg					9100	=	2840	=
Antimony	mg/kg					0.55	J	0.18	UJ
Arsenic	mg/kg					9.6	J	1.3	J
Barium	mg/kg					33.4	=	10.2	J
Beryllium	mg/kg					0.36	J	0.18	J
Cadmium	mg/kg					0.03	UJ	0 02	UJ
Calcium	mg/kg					5010	J	490	J
Chromium, Total	mg/kg					17.2	J	4.5	J
Chromium, Total	ug/L	13.3	J	3.8	J				
Cobalt	mg/kg					3.5	J	0.78	J
Copper	mg/kg					21.6	=	1.4	J
Iron	mg/kg					11900	=	2330	=
Lead	mg/kg					58.3	=	4.9	=
Magnesium	mg/kg					1230	J	248	J
Manganese	mg/kg					167	=	15.8	=
Mercury	mg/kg					0 16	=	0.05	U
Nickel	mg/kg					9.2	=	1 7	J
Potassium	mg/kg					731	J	135	J
Selenium	mg/kg					1.3	=	0.4	J
Silver	mg/kg					0.05	U	0 04	U
Sodium	mg/kg					353	J	96.8	J
Thallium	mg/kg					0.25	R	0.18	R
Tin (Sn)	mg/kg					6	J	3.2	J
Vanadium	mg/kg					22.4	=	6	=
Zinc, SPLP	ug/L	129	J	31.1	J				
Zinc	mg/kg					82.9	J	6.6	J

Soil Metals

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/20/1999		10/20/1999		10/29/1999		10/29/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aluminum, SPLP	ug/L	595	=	9940	=				
Antimony, SPLP	ug/L	2.4	U	5.2	J				
Arsenic,SPLP	ug/L	2	U	17 4	=				
Barium, SPLP	ug/L	275	=	2090	=				
Beryllium, SPLP	ug/L	0.9	U	1.2	J				
Cadmium, SPLP	ug/L	0 3	UJ	0.3	UJ				
Calcium, SPLP	ug/L	12200	=	5990	=				
Cobalt, SPLP	ug/L	0 5	U	1.6	J				
Copper, SPLP	ug/L	2	J	20.6	J				
Iron, SPLP	ug/L	538	J	13100	J				
Lead, SPLP	ug/L	2.1	U	33.9	=				
Magnesium, SPLP	ug/L	935	J	3360	J				
Manganese, SPLP	ug/L	3	J	89.6	=				
Mercury, SPLP	ug/L	0 4	U	0.42	=				
Nickel, SPLP	ug/L	2.2	J	9.2	J				
Potassium, SPLP	ug/L	325	J	8240	=				
Selenium, SPLP	ug/L	1.7	U	5 1	J				
Silver, SPLP	ug/L	0 5	UJ	0.5	UJ				
Sodium, SPLP	ug/L	5480	=	57000	=				
Thallium, SPLP	ug/L	2 4	U	2.4	U				
Tin (Sn), SPLP	ug/L	2 7	U	2 9	J				
Vanadium, SPLP	ug/L	3.8	J	47.1	J				
Aluminum	mg/kg					5200	=	21700	=
Antimony	mg/kg					0.5	J	0.6	J
Arsenic	mg/kg					2.3	J	17.7	J
Barium	mg/kg					16.3	J	157	=
Beryllium	mg/kg					0.09	U	1.4	=
Cadmium	mg/kg					0.03	J	0.04	UJ
Calcium	mg/kg					30100	J	16800	J
Chromium, Total	mg/kg					11	J	32.1	J
Chromium, Total	ug/L	2.5	J	19.8	J				
Cobalt	mg/kg					1.5	J	5 8	J
Copper	mg/kg					11.2	=	28.4	=
Iron	mg/kg					4790	=	26100	=
Lead	mg/kg					17	=	106	=
Magnesium	mg/kg					915	J	3790	J
Manganese	mg/kg					83.3	=	722	=
Mercury	mg/kg					0.05	=	0.62	=
Nickel	mg/kg					4 5	=	11.1	=
Potassium	mg/kg					323	J	2330	J
Selenium	mg/kg					0.52	J	1.9	=
Silver	mg/kg					0.05	U	0.06	U
Sodium	mg/kg					276	J	2100	=
Thallium	mg/kg					0.23	R	1.4	R
Tin (Sn)	mg/kg					4 5	J	5.3	J
Vanadium	mg/kg					9.4	=	48 4	=
Zinc, SPLP	ug/L	45 1	J	387	J				
Zinc	mg/kg					98.7	J	255	J

Soil Metals

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/20/1999		10/20/1999		10/29/1999		10/29/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aluminum, SPLP	ug/L	3950	=	1790	=				
Antimony, SPLP	ug/L	4 1	J	2.4	U				
Arsenic,SPLP	ug/L	5.2	J	2	U				
Barium, SPLP	ug/L	306	=	1000	=				
Beryllium, SPLP	ug/L	0.9	U	0.9	U				
Cadmium, SPLP	ug/L	0.3	UJ	0.3	UJ				
Calcium, SPLP	ug/L	16000	=	12600	=				
Cobalt, SPLP	ug/L	0 5	U	0 5	U				
Copper, SPLP	ug/L	15	J	4.1	J				
Iron, SPLP	ug/L	3840	J	1590	J				
Lead, SPLP	ug/L	17.8	=	2.2	J				
Magnesium, SPLP	ug/L	978	J	2440	J				
Manganese, SPLP	ug/L	28 4	=	9.6	J				
Mercury, SPLP	ug/L	0.4	U	0.4	U				
Nickel, SPLP	ug/L	3.4	J	2.5	J				
Potassium, SPLP	ug/L	449	J	4190	J				
Selenium, SPLP	ug/L	1.7	U	1 7	U				
Silver, SPLP	ug/L	0.5	UJ	0.5	UJ				
Sodium, SPLP	ug/L	1600	J	15500	=				
Thallium, SPLP	ug/L	2.4	U	2.4	U				
Tin (Sn), SPLP	ug/L	4.4	J	2 7	U				
Vanadium, SPLP	ug/L	12.1	J	6.6	J				
Aluminum	mg/kg					6700	=	18300	=
Antimony	mg/kg					0.7	J	0.98	J
Arsenic	mg/kg					5.3	J	10 6	J
Barium	mg/kg					23 4	=	30.8	=
Beryllium	mg/kg					0.19	J	0.67	=
Cadmium	mg/kg					0.15	J	0.04	UJ
Calcium	mg/kg					38400	J	12800	J
Chromium, Total	mg/kg					18	J	28.4	J
Chromium, Total	ug/L	9.4	J	4	J				
Cobalt	mg/kg					2.7	J	5.4	J
Copper	mg/kg					45.4	=	25.3	=
Iron	mg/kg					8570	=	18900	=
Lead	mg/kg					56	=	39.1	=
Magnesium	mg/kg					1270	J	2620	J
Manganese	mg/kg					110	=	236	=
Mercury	mg/kg					0 09	=	0.3	=
Nickel	mg/kg					8.3	=	11	=
Potassium	mg/kg					536	J	1460	J
Selenium	mg/kg					0.7	J	1.7	=
Silver	mg/kg					0 05	U	0 07	U
Sodium	mg/kg					270	J	483	J
Thallium	mg/kg					1.3	R	1.6	R
Tin (Sn)	mg/kg					17.2	=	7.1	J
Vanadium	mg/kg					14.2	=	39.6	=
Zinc, SPLP	ug/L	134	J	127	J				
Zinc	mg/kg					128	J	91.1	J

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AOC 619, Zone F

Soil PBCs

	StationID	F619SB001		F619SB001		F619SB001	
	SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB001T1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/23/1999		10/23/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	Units						
PCB-1016 (Arochlor 1016), SPLP	ug/L	1	U	1	U		
PCB-1221 (Arochlor 1221), SPLP	ug/L	2	U	2	U		
PCB-1232 (Arochlor 1232), SPLP	ug/L	1	U	1	U		
PCB-1242 (Arochlor 1242), SPLP	ug/L	1	U	1	U		
PCB-1248 (Arochlor 1248), SPLP	ug/L	1	U	1	U		
PCB-1254 (Arochlor 1254), SPLP	ug/L	1	U	1	U		
PCB-1260 (Arochlor 1260), SPLP	ug/L	1	U	1	U		
PCB-1016 (Arochlor 1016)	ug/kg					40	U
PCB-1221 (Arochlor 1221)	ug/kg					80	U
PCB-1232 (Arochlor 1232)	ug/kg					40	U
PCB-1242 (Arochlor 1242)	ug/kg					40	U
PCB-1248 (Arochlor 1248)	ug/kg					40	U
PCB-1254 (Arochlor 1254)	ug/kg					40	U
PCB-1260 (Arochlor 1260)	ug/kg					40	U

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Soil PBCs

	StationID	F619SB001		F619SB004		F619SB004	
	SampleID	619SB001T2 (3-5ft)		619SB004S1 (0-1ft)		619SB004S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/20/1999		10/23/1999		10/23/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	Units						
PCB-1016 (Arochlor 1016), SPLP	ug/L			1	U	1	U
PCB-1221 (Arochlor 1221), SPLP	ug/L			2	U	2	U
PCB-1232 (Arochlor 1232), SPLP	ug/L			1	U	1	U
PCB-1242 (Arochlor 1242), SPLP	ug/L			1	U	1	U
PCB-1248 (Arochlor 1248), SPLP	ug/L			1	U	1	U
PCB-1254 (Arochlor 1254), SPLP	ug/L			1	U	1	U
PCB-1260 (Arochlor 1260), SPLP	ug/L			1	U	1	U
PCB-1016 (Arochlor 1016)	ug/kg	38	U				
PCB-1221 (Arochlor 1221)	ug/kg	77	U				
PCB-1232 (Arochlor 1232)	ug/kg	38	U				
PCB-1242 (Arochlor 1242)	ug/kg	38	U				
PCB-1248 (Arochlor 1248)	ug/kg	38	U				
PCB-1254 (Arochlor 1254)	ug/kg	38	U				
PCB-1260 (Arochlor 1260)	ug/kg	38	U				

Soil PBCs

	StationID	F619SB004		F619SB004		F619SB015	
	SampleID	619SB004T1 (0-1ft)		619SB004T2 (3-5ft)		619SB015S1 (0-1ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/20/1999		10/20/1999		10/23/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	Units						
PCB-1016 (Arochlor 1016), SPLP	ug/L					1	U
PCB-1221 (Arochlor 1221), SPLP	ug/L					2	U
PCB-1232 (Arochlor 1232), SPLP	ug/L					1	U
PCB-1242 (Arochlor 1242), SPLP	ug/L					1	U
PCB-1248 (Arochlor 1248), SPLP	ug/L					1	U
PCB-1254 (Arochlor 1254), SPLP	ug/L					1	U
PCB-1260 (Arochlor 1260), SPLP	ug/L					1	U
PCB-1016 (Arochlor 1016)	ug/kg	38	U	52	U		
PCB-1221 (Arochlor 1221)	ug/kg	76	U	100	U		
PCB-1232 (Arochlor 1232)	ug/kg	38	U	52	U		
PCB-1242 (Arochlor 1242)	ug/kg	38	U	52	U		
PCB-1248 (Arochlor 1248)	ug/kg	38	U	52	U		
PCB-1254 (Arochlor 1254)	ug/kg	38	U	52	U		
PCB-1260 (Arochlor 1260)	ug/kg	38	U	52	U		

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Soil PBCs

	StationID	F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020	
Parameter	Units						
PCB-1016 (Arochlor 1016), SPLP	ug/L	1	U				
PCB-1221 (Arochlor 1221), SPLP	ug/L	2	U				
PCB-1232 (Arochlor 1232), SPLP	ug/L	1	U				
PCB-1242 (Arochlor 1242), SPLP	ug/L	1	U				
PCB-1248 (Arochlor 1248), SPLP	ug/L	1	U				
PCB-1254 (Arochlor 1254), SPLP	ug/L	1	U				
PCB-1260 (Arochlor 1260), SPLP	ug/L	1	U				
PCB-1016 (Arochlor 1016)	ug/kg			37	U	50	U
PCB-1221 (Arochlor 1221)	ug/kg			74	U	100	U
PCB-1232 (Arochlor 1232)	ug/kg			37	U	50	U
PCB-1242 (Arochlor 1242)	ug/kg			37	U	50	U
PCB-1248 (Arochlor 1248)	ug/kg			37	U	50	U
PCB-1254 (Arochlor 1254)	ug/kg			37	U	50	U
PCB-1260 (Arochlor 1260)	ug/kg			110	=	50	U

Soil Pesticides

	StationID	F619SB001		F619SB001		F619SB001		F619SB001	
	SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/23/1999		10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aldrin, SPLP	ug/L	0.05	U	0.05	U				
Dieldrin, SPLP	ug/L	0.1	U	0.1	U				
Endosulfan I, SPLP	ug/L	0.05	U	0.05	U				
Endosulfan II, SPLP	ug/L	0.1	U	0.1	U				
Endosulfan Sulfate, SPLP	ug/L	0.1	U	0.1	U				
Endrin Aldehyde, SPLP	ug/L	0.1	U	0.1	U				
Endrin Ketone, SPLP	ug/L	0.1	U	0.1	U				
Endrin, SPLP	ug/L	0.1	U	0.1	U				
Gamma BHC (Lindane), SPLP	ug/L	0.05	U	0.05	U				
Gamma-Chlordane, SPLP	ug/L	0.05	U	0.05	U				
Heptachlor Epoxide, SPLP	ug/L	0.05	U	0.05	U				
Heptachlor, SPLP	ug/L	0.05	U	0.05	U				
Methoxychlor, SPLP	ug/L	0.5	U	0.5	U				
P,P'-DDD, SPLP	ug/L	0.1	U	0.1	U				
P,P'-DDE, SPLP	ug/L	0.1	U	0.1	U				
P,P'-DDT, SPLP	ug/L	0.1	U	0.1	U				
Toxaphene, SPLP	ug/L	5	U	5	U				
Alpha BHC, SPLP	ug/L	0.05	U	0.05	U				
Alpha BHC	ug/kg					2	U	2	U
Gamma BHC (Lindane)	ug/kg					2	U	2	U
Beta BHC, SPLP	ug/L	0.05	U	0.05	U				
Beta BHC	ug/kg					2	U	2	U
Heptachlor	ug/kg					2	U	2	U
Delta BHC, SPLP	ug/L	0.05	U	0.05	U				
Delta BHC	ug/kg					2	U	2	U
Aldrin	ug/kg					2	U	2	U
Heptachlor Epoxide	ug/kg					2	U	2	U
Gamma-Chlordane	ug/kg					2	U	2	U
Alpha-Chlordane, SPLP	ug/L	0.05	U	0.05	U				
Alpha-Chlordane	ug/kg					2	U	2	U
Endosulfan I	ug/kg					2	U	2	U
P,P'-DDE	ug/kg					4	U	3.8	U
Dieldrin	ug/kg					4	U	3.8	U
Endrin	ug/kg					4	U	3.8	U
P,P'-DDD	ug/kg					4	U	3.8	U
Endosulfan II	ug/kg					4	U	3.8	U
P,P'-DDT	ug/kg					4	U	3.8	U
Endrin Aldehyde	ug/kg					4	U	3.8	U
Endosulfan Sulfate	ug/kg					4	U	3.8	U
Methoxychlor	ug/kg					20	U	20	U
Endrin Ketone	ug/kg					4	U	3.8	U
Toxaphene	ug/kg					200	U	200	U

Soil Pesticides

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/23/1999		10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aldrin, SPLP	ug/L	0.05	U	0 05	U				
Dieldrin, SPLP	ug/L	0.1	U	0.1	U				
Endosulfan I, SPLP	ug/L	0.05	U	0.05	U				
Endosulfan II, SPLP	ug/L	0 1	U	0.1	U				
Endosulfan Sulfate, SPLP	ug/L	0.1	U	0.1	U				
Endrin Aldehyde, SPLP	ug/L	0.1	U	0.1	U				
Endrin Ketone, SPLP	ug/L	0.1	U	0.1	U				
Endrin, SPLP	ug/L	0.1	U	0.1	U				
Gamma BHC (Lindane), SPLP	ug/L	0.05	U	0 05	U				
Gamma-Chlordane, SPLP	ug/L	0.05	U	0 05	U				
Heptachlor Epoxide, SPLP	ug/L	0.05	U	0.05	U				
Heptachlor, SPLP	ug/L	0 05	U	0 05	U				
Methoxychlor, SPLP	ug/L	0.5	U	0.5	U				
P,P'-DDD, SPLP	ug/L	0 1	U	0.1	U				
P,P'-DDE, SPLP	ug/L	0 1	U	0.1	U				
P,P'-DDT, SPLP	ug/L	0.1	U	0 1	U				
Toxaphene, SPLP	ug/L	5	U	5	U				
Alpha BHC, SPLP	ug/L	0.05	U	0 05	U				
Alpha BHC	ug/kg					2	U	2.7	U
Gamma BHC (Lindane)	ug/kg					2	U	2.7	U
Beta BHC, SPLP	ug/L	0.05	U	0.05	U				
Beta BHC	ug/kg					2	U	2 7	U
Heptachlor	ug/kg					2	U	2.7	U
Delta BHC, SPLP	ug/L	0.05	U	0.05	U				
Delta BHC	ug/kg					2	U	2.7	U
Aldrin	ug/kg					2	U	2.7	U
Heptachlor Epoxide	ug/kg					2	U	2.7	U
Gamma-Chlordane	ug/kg					2	U	2.7	U
Alpha-Chlordane, SPLP	ug/L	0.05	U	0.05	U				
Alpha-Chlordane	ug/kg					2	U	2 7	U
Endosulfan I	ug/kg					2	U	2 7	U
P,P'-DDE	ug/kg					3.8	U	5 2	U
Dieldrin	ug/kg					3 8	U	5 2	U
Endrin	ug/kg					3.8	U	5.2	U
P,P'-DDD	ug/kg					3.8	U	5.2	U
Endosulfan II	ug/kg					3.8	U	5.2	U
P,P'-DDT	ug/kg					3.8	U	5.2	U
Endrin Aldehyde	ug/kg					3 8	U	5.2	U
Endosulfan Sulfate	ug/kg					3.8	U	5 2	U
Methoxychlor	ug/kg					20	U	27	U
Endrin Ketone	ug/kg					3 8	U	5 2	U
Toxaphene	ug/kg					200	U	270	U

Soil Pesticides

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/23/1999		10/23/1999		10/20/1999		10/20/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Aldrin, SPLP	ug/L	0 05	U	0.05	U				
Dieldrin, SPLP	ug/L	0.1	U	0.1	U				
Endosulfan I, SPLP	ug/L	0.05	U	0.05	U				
Endosulfan II, SPLP	ug/L	0.1	U	0.1	U				
Endosulfan Sulfate, SPLP	ug/L	0 1	U	0 1	U				
Endrin Aldehyde, SPLP	ug/L	0.1	U	0.1	U				
Endrin Ketone, SPLP	ug/L	0 1	U	0 1	U				
Endrin, SPLP	ug/L	0.1	U	0.1	U				
Gamma BHC (Lindane), SPLP	ug/L	0.05	U	0.05	U				
Gamma-Chlordane, SPLP	ug/L	0.05	U	0 05	U				
Heptachlor Epoxide, SPLP	ug/L	0.05	U	0.05	U				
Heptachlor, SPLP	ug/L	0.05	U	0 05	U				
Methoxychlor, SPLP	ug/L	0.5	U	0 5	U				
P,P'-DDD, SPLP	ug/L	0.1	U	0 1	U				
P,P'-DDE, SPLP	ug/L	0.1	U	0 1	U				
P,P'-DDT, SPLP	ug/L	0.1	U	0.1	U				
Toxaphene, SPLP	ug/L	5	U	5	U				
Alpha BHC, SPLP	ug/L	0.05	U	0 05	U				
Alpha BHC	ug/kg					1.9	U	2.6	U
Gamma BHC (Lindane)	ug/kg					1.9	U	2.6	U
Beta BHC, SPLP	ug/L	0.05	U	0.05	U				
Beta BHC	ug/kg					1.9	U	2.6	U
Heptachlor	ug/kg					1.9	U	2.6	U
Delta BHC, SPLP	ug/L	0.05	U	0 05	U				
Delta BHC	ug/kg					1.9	U	2.6	U
Aldrin	ug/kg					1 9	U	2.6	U
Heptachlor Epoxide	ug/kg					1.9	U	2.6	U
Gamma-Chlordane	ug/kg					12	=	2.6	U
Alpha-Chlordane, SPLP	ug/L	0.05	U	0.05	U				
Alpha-Chlordane	ug/kg					5.4	=	2 6	U
Endosulfan I	ug/kg					1.9	U	2.6	U
P,P'-DDE	ug/kg					6.2	=	5	U
Dieldrin	ug/kg					3.7	U	5	U
Endrin	ug/kg					3.7	U	5	U
P,P'-DDD	ug/kg					3.7	U	5	U
Endosulfan II	ug/kg					3.7	U	5	U
P,P'-DDT	ug/kg					3.7	U	5	U
Endrin Aldehyde	ug/kg					3.7	U	5	U
Endosulfan Sulfate	ug/kg					3.7	U	5	U
Methoxychlor	ug/kg					19	U	26	U
Endrin Ketone	ug/kg					3.7	U	5	U
Toxaphene	ug/kg					190	U	260	U

Soil SVOCs

StationID	F619SB001		F619SB001		F619SB001		F619SB001	
SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)	
DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
DateAnalyzed	10/25/1999		10/22/1999		10/21/1999		10/21/1999	
SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units							
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	5	U			
1,2-Dichlorobenzene, SPLP	ug/L	5	U	5	U			
1,3-Dichlorobenzene, SPLP	ug/L	5	U	5	U			
1,4-Dichlorobenzene, SPLP	ug/L	5	U	5	U			
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L	5	U	5	U			
2,2'-Oxybis(1-Chloro)Propane	ug/kg					400	U	390	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	5	U			
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	5	U			
2,4-Dichlorophenol, SPLP	ug/L	5	U	5	U			
2,4-Dimethylphenol, SPLP	ug/L	5	U	5	U			
2,4-Dinitrophenol, SPLP	ug/L	10	U	10	U			
2,4-Dinitrotoluene, SPLP	ug/L	5	U	5	U			
2,6-Dinitrotoluene, SPLP	ug/L	5	U	5	U			
2-Chloronaphthalene, SPLP	ug/L	5	U	5	U			
2-Chlorophenol, SPLP	ug/L	5	U	5	U			
2-Methylnaphthalene, SPLP	ug/L	5	U	5	U			
2-Methylnaphthalene	ug/kg					400	U	390	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	5	U			
2-Methylphenol (o-Cresol)	ug/kg					400	U	390	U
2-Nitroaniline, SPLP	ug/L	5	U	5	U			
2-Nitrophenol, SPLP	ug/L	5	U	5	U			
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	10	U			
3-Nitroaniline, SPLP	ug/L	5	U	5	U			
4,6-Dinitro-2-Methylphenol, SPLP	ug/L	10	U	10	U			
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U			
4-Chloro-3-Methylphenol, SPLP	ug/L	5	U	5	U			
4-Chloroaniline, SPLP	ug/L	5	U	5	U			
4-Chlorophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U			
4-Nitroaniline, SPLP	ug/L	5	U	5	U			
4-Nitrophenol, SPLP	ug/L	10	U	10	U			
Benzoic Acid, SPLP	ug/L	25	U	25	U			
Benzyl Alcohol, SPLP	ug/L	5	U	5	U			
Benzyl Butyl Phthalate, SPLP	ug/L	5	U	5	U			
Bis(2-Chloroethoxy) Methane, SPLP	ug/L	5	U	5	U			
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L	5	U	5	U			
Di-N-Butyl Phthalate, SPLP	ug/L	5	U	5	U			
Di-N-Octylphthalate, SPLP	ug/L	5	U	5	U			
Dibenzofuran, SPLP	ug/L	5	U	5	U			
Diethyl Phthalate, SPLP	ug/L	5	U	5	U			
Dimethyl Phthalate, SPLP	ug/L	5	U	5	U			
Hexachlorobenzene, SPLP	ug/L	5	U	5	U			
Hexachlorobutadiene, SPLP	ug/L	5	U	5	U			
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	5	U			
Hexachloroethane, SPLP	ug/L	5	U	5	U			
Isophorone, SPLP	ug/L	5	U	5	U			
N-Nitrosodi-N-Propylamine, SPLP	ug/L	5	U	5	U			
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	5	U			
Nitrobenzene, SPLP	ug/L	5	U	5	U			
Pentachlorophenol, SPLP	ug/L	10	U	10	U			
Phenol, SPLP	ug/L	5	U	5	U			
Phenol	ug/kg					400	U	390	U
Acenaphthylene, SPLP	ug/L	5	U	5	U			
Acenaphthylene	ug/kg					400	U	390	U

Soil SVOCs

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/25/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	5	U				
1,2-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,3-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
1,4-Dichlorobenzene, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L	5	U	5	U				
2,2'-Oxybis(1-Chloro)Propane	ug/kg					380	U	530	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dichlorophenol, SPLP	ug/L	5	U	5	U				
2,4-Dimethylphenol, SPLP	ug/L	5	U	5	U				
2,4-Dinitrophenol, SPLP	ug/L	10	U	10	U				
2,4-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2,6-Dinitrotoluene, SPLP	ug/L	5	U	5	U				
2-Chloronaphthalene, SPLP	ug/L	5	U	5	U				
2-Chlorophenol, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene, SPLP	ug/L	5	U	5	U				
2-Methylnaphthalene	ug/kg					380	U	530	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	5	U				
2-Methylphenol (o-Cresol)	ug/kg					380	U	530	U
2-Nitroaniline, SPLP	ug/L	5	U	5	U				
2-Nitrophenol, SPLP	ug/L	5	U	5	U				
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	10	U				
3-Nitroaniline, SPLP	ug/L	5	U	5	U				
4,6-Dinitro-2-Methylphenol, SPLP	ug/L	10	U	10	U				
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U				
4-Chloro-3-Methylphenol, SPLP	ug/L	5	U	5	U				
4-Chloroaniline, SPLP	ug/L	5	U	5	U				
4-Chlorophenyl Phenyl Ether, SPLP	ug/L	5	U	5	U				
4-Nitroaniline, SPLP	ug/L	5	U	5	U				
4-Nitrophenol, SPLP	ug/L	10	U	10	U				
Benzoic Acid, SPLP	ug/L	25	U	26	U				
Benzyl Alcohol, SPLP	ug/L	5	U	5	U				
Benzyl Butyl Phthalate, SPLP	ug/L	5	U	5	U				
Bis(2-Chloroethoxy) Methane, SPLP	ug/L	5	U	5	U				
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L	5	U	5	U				
Di-N-Butyl Phthalate, SPLP	ug/L	5	U	5	U				
Di-N-Octylphthalate, SPLP	ug/L	5	U	5	U				
Dibenzofuran, SPLP	ug/L	5	U	5	U				
Diethyl Phthalate, SPLP	ug/L	5	U	5	U				
Dimethyl Phthalate, SPLP	ug/L	5	U	5	U				
Hexachlorobenzene, SPLP	ug/L	5	U	5	U				
Hexachlorobutadiene, SPLP	ug/L	5	U	5	U				
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	5	U				
Hexachloroethane, SPLP	ug/L	5	U	5	U				
Isophorone, SPLP	ug/L	5	U	5	U				
N-Nitrosodi-N-Propylamine, SPLP	ug/L	5	U	5	U				
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	5	U				
Nitrobenzene, SPLP	ug/L	5	U	5	U				
Pentachlorophenol, SPLP	ug/L	10	U	10	U				
Phenol, SPLP	ug/L	5	U	5	U				
Phenol	ug/kg					380	U	530	U
Acenaphthylene, SPLP	ug/L	5	U	5	U				
Acenaphthylene	ug/kg					380	U	530	U

Soil SVOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/26/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,2,4-Trichlorobenzene, SPLP	ug/L	5	U	6	U				
1,2-Dichlorobenzene, SPLP	ug/L	5	U	6	U				
1,3-Dichlorobenzene, SPLP	ug/L	5	U	6	U				
1,4-Dichlorobenzene, SPLP	ug/L	5	U	6	U				
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L	5	U	6	U				
2,2'-Oxybis(1-Chloro)Propane	ug/kg					370	U	510	U
2,4,5-Trichlorophenol, SPLP	ug/L	5	U	6	U				
2,4,6-Trichlorophenol, SPLP	ug/L	5	U	6	U				
2,4-Dichlorophenol, SPLP	ug/L	5	U	6	U				
2,4-Dimethylphenol, SPLP	ug/L	5	U	6	U				
2,4-Dinitrophenol, SPLP	ug/L	10	U	12	U				
2,4-Dinitrotoluene, SPLP	ug/L	5	U	6	U				
2,6-Dinitrotoluene, SPLP	ug/L	5	U	6	U				
2-Chloronaphthalene, SPLP	ug/L	5	U	6	U				
2-Chlorophenol, SPLP	ug/L	5	U	6	U				
2-Methylnaphthalene, SPLP	ug/L	5	U	6	U				
2-Methylnaphthalene	ug/kg					370	U	510	U
2-Methylphenol (o-Cresol), SPLP	ug/L	5	U	6	U				
2-Methylphenol (o-Cresol)	ug/kg					370	U	510	U
2-Nitroaniline, SPLP	ug/L	5	U	6	U				
2-Nitrophenol, SPLP	ug/L	5	U	6	U				
3,3'-Dichlorobenzidine, SPLP	ug/L	10	U	12	U				
3-Nitroaniline, SPLP	ug/L	5	U	6	U				
4,6-Dinitro-2-Methylphenol, SPLP	ug/L	10	U	12	U				
4-Bromophenyl Phenyl Ether, SPLP	ug/L	5	U	6	U				
4-Chloro-3-Methylphenol, SPLP	ug/L	5	U	6	U				
4-Chloroaniline, SPLP	ug/L	5	U	6	U				
4-Chlorophenyl Phenyl Ether, SPLP	ug/L	5	U	6	U				
4-Nitroaniline, SPLP	ug/L	5	U	6	U				
4-Nitrophenol, SPLP	ug/L	10	U	12	U				
Benzoic Acid, SPLP	ug/L	26	U	29	U				
Benzyl Alcohol, SPLP	ug/L	5	U	6	U				
Benzyl Butyl Phthalate, SPLP	ug/L	5	U	6	U				
Bis(2-Chloroethoxy) Methane, SPLP	ug/L	5	U	6	U				
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L	5	U	6	U				
Di-N-Butyl Phthalate, SPLP	ug/L	5	U	6	U				
Di-N-Octylphthalate, SPLP	ug/L	5	U	6	U				
Dibenzofuran, SPLP	ug/L	5	U	6	U				
Diethyl Phthalate, SPLP	ug/L	5	U	1	J				
Dimethyl Phthalate, SPLP	ug/L	5	U	6	U				
Hexachlorobenzene, SPLP	ug/L	5	U	6	U				
Hexachlorobutadiene, SPLP	ug/L	5	U	6	U				
Hexachlorocyclopentadiene, SPLP	ug/L	5	U	6	U				
Hexachloroethane, SPLP	ug/L	5	U	6	U				
Isophorone, SPLP	ug/L	5	U	6	U				
N-Nitrosodi-N-Propylamine, SPLP	ug/L	5	U	6	U				
N-Nitrosodiphenylamine, SPLP	ug/L	5	U	6	U				
Nitrobenzene, SPLP	ug/L	5	U	6	U				
Pentachlorophenol, SPLP	ug/L	10	U	12	U				
Phenol, SPLP	ug/L	5	U	6	U				
Phenol	ug/kg					370	U	510	U
cenaphthylene, SPLP	ug/L	5	U	6	U				
cenaphthylene	ug/kg					370	U	510	U

Soil SVOCs

	StationID	F619SB016		F619SB016		F619SB017		F619SB017	
	SampleID	619SB01601 (0-1ft)		619SB01602 (3-5ft)		619SB01701 (0-1ft)		619SB01702 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/15/1999		10/15/1999	
	DateAnalyzed	10/29/1999		10/28/1999		10/28/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	Units								
1,2,4-Trichlorobenzene, SPLP	ug/L								
1,2-Dichlorobenzene, SPLP	ug/L								
1,3-Dichlorobenzene, SPLP	ug/L								
1,4-Dichlorobenzene, SPLP	ug/L								
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L								
2,2'-Oxybis(1-Chloro)Propane	ug/kg	410	U	470	U	370	U	410	U
2,4,5-Trichlorophenol, SPLP	ug/L								
2,4,6-Trichlorophenol, SPLP	ug/L								
2,4-Dichlorophenol, SPLP	ug/L								
2,4-Dimethylphenol, SPLP	ug/L								
2,4-Dinitrophenol, SPLP	ug/L								
2,4-Dinitrotoluene, SPLP	ug/L								
2,6-Dinitrotoluene, SPLP	ug/L								
2-Chloronaphthalene, SPLP	ug/L								
2-Chlorophenol, SPLP	ug/L								
2-Methylnaphthalene, SPLP	ug/L								
2-Methylnaphthalene	ug/kg	410	U	470	U	370	U	410	U
2-Methylphenol (o-Cresol), SPLP	ug/L								
2-Methylphenol (o-Cresol)	ug/kg	410	U	470	U	370	U	410	U
2-Nitroaniline, SPLP	ug/L								
2-Nitrophenol, SPLP	ug/L								
3,3'-Dichlorobenzidine, SPLP	ug/L								
3-Nitroaniline, SPLP	ug/L								
4,6-Dinitro-2-Methylphenol, SPLP	ug/L								
4-Bromophenyl Phenyl Ether, SPLP	ug/L								
4-Chloro-3-Methylphenol, SPLP	ug/L								
4-Chloroaniline, SPLP	ug/L								
4-Chlorophenyl Phenyl Ether, SPLP	ug/L								
4-Nitroaniline, SPLP	ug/L								
4-Nitrophenol, SPLP	ug/L								
Benzoic Acid, SPLP	ug/L								
Benzyl Alcohol, SPLP	ug/L								
Benzyl Butyl Phthalate, SPLP	ug/L								
Bis(2-Chloroethoxy) Methane, SPLP	ug/L								
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L								
Di-N-Butyl Phthalate, SPLP	ug/L								
Di-N-Octylphthalate, SPLP	ug/L								
Dibenzofuran, SPLP	ug/L								
Diethyl Phthalate, SPLP	ug/L								
Dimethyl Phthalate, SPLP	ug/L								
Hexachlorobenzene, SPLP	ug/L								
Hexachlorobutadiene, SPLP	ug/L								
Hexachlorocyclopentadiene, SPLP	ug/L								
Hexachloroethane, SPLP	ug/L								
sophorone, SPLP	ug/L								
N-Nitrosodi-N-Propylamine, SPLP	ug/L								
N-Nitrosodiphenylamine, SPLP	ug/L								
Nitrobenzene, SPLP	ug/L								
Pentachlorophenol, SPLP	ug/L								
Phenol, SPLP	ug/L								
Phenol	ug/kg	410	U	470	U	370	U	410	U
Acenaphthylene, SPLP	ug/L								
Acenaphthylene	ug/kg	410	U	470	U	370	U	410	U

Soil SVOCs

	StationID	F619SB018		F619SB018		F619SB019		F619SB019	
	SampleID	619SB01801 (0-1ft)		619SB01802 (3-5ft)		619SB01901 (0-1ft)		619SB01902 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/16/1999		10/16/1999	
	DateAnalyzed	10/28/1999		10/28/1999		10/29/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN025		EN025	
Parameter	Units								
1,2,4-Trichlorobenzene, SPLP	ug/L								
1,2-Dichlorobenzene, SPLP	ug/L								
1,3-Dichlorobenzene, SPLP	ug/L								
1,4-Dichlorobenzene, SPLP	ug/L								
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L								
2,2'-Oxybis(1-Chloro)Propane	ug/kg	360	U	400	U	360	U	470	U
2,4,5-Trichlorophenol, SPLP	ug/L								
2,4,6-Trichlorophenol, SPLP	ug/L								
2,4-Dichlorophenol, SPLP	ug/L								
2,4-Dimethylphenol, SPLP	ug/L								
2,4-Dinitrophenol, SPLP	ug/L								
2,4-Dinitrotoluene, SPLP	ug/L								
2,6-Dinitrotoluene, SPLP	ug/L								
2-Chloronaphthalene, SPLP	ug/L								
2-Chlorophenol, SPLP	ug/L								
2-Methylnaphthalene, SPLP	ug/L								
2-Methylnaphthalene	ug/kg	360	U	400	U	360	U	470	U
2-Methylphenol (o-Cresol), SPLP	ug/L								
2-Methylphenol (o-Cresol)	ug/kg	360	U	400	U	360	U	470	U
2-Nitroaniline, SPLP	ug/L								
2-Nitrophenol, SPLP	ug/L								
3,3'-Dichlorobenzidine, SPLP	ug/L								
3-Nitroaniline, SPLP	ug/L								
4,6-Dinitro-2-Methylphenol, SPLP	ug/L								
4-Bromophenyl Phenyl Ether, SPLP	ug/L								
4-Chloro-3-Methylphenol, SPLP	ug/L								
4-Chloroaniline, SPLP	ug/L								
4-Chlorophenyl Phenyl Ether, SPLP	ug/L								
4-Nitroaniline, SPLP	ug/L								
4-Nitrophenol, SPLP	ug/L								
Benzoic Acid, SPLP	ug/L								
Benzyl Alcohol, SPLP	ug/L								
Benzyl Butyl Phthalate, SPLP	ug/L								
Bis(2-Chloroethoxy) Methane, SPLP	ug/L								
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L								
Di-N-Butyl Phthalate, SPLP	ug/L								
Di-N-Octylphthalate, SPLP	ug/L								
Dibenzofuran, SPLP	ug/L								
Diethyl Phthalate, SPLP	ug/L								
Dimethyl Phthalate, SPLP	ug/L								
Hexachlorobenzene, SPLP	ug/L								
Hexachlorobutadiene, SPLP	ug/L								
Hexachlorocyclopentadiene, SPLP	ug/L								
Hexachloroethane, SPLP	ug/L								
Isophorone, SPLP	ug/L								
N-Nitrosodi-N-Propylamine, SPLP	ug/L								
N-Nitrosodiphenylamine, SPLP	ug/L								
Nitrobenzene, SPLP	ug/L								
Pentachlorophenol, SPLP	ug/L								
Phenol, SPLP	ug/L								
Phenol	ug/kg	360	U	400	U	360	U	470	U
Acenaphthylene, SPLP	ug/L								
Acenaphthylene	ug/kg	360	U	400	U	360	U	470	U

Soil SVOCs

	StationID	F619SB020		F619SB020	
	SampleID	619SB02001 (0-1ft)		619SB02002 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999	
	DateAnalyzed	10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023	
Parameter	Units				
1,2,4-Trichlorobenzene, SPLP	ug/L				
1,2-Dichlorobenzene, SPLP	ug/L				
1,3-Dichlorobenzene, SPLP	ug/L				
1,4-Dichlorobenzene, SPLP	ug/L				
2,2'-Oxybis(1-Chloro)Propane, SPLP	ug/L				
2,2'-Oxybis(1-Chloro)Propane	ug/kg	370	U	400	U
2,4,5-Trichlorophenol, SPLP	ug/L				
2,4,6-Trichlorophenol, SPLP	ug/L				
2,4-Dichlorophenol, SPLP	ug/L				
2,4-Dimethylphenol, SPLP	ug/L				
2,4-Dinitrophenol, SPLP	ug/L				
2,4-Dinitrotoluene, SPLP	ug/L				
2,6-Dinitrotoluene, SPLP	ug/L				
2-Chloronaphthalene, SPLP	ug/L				
2-Chlorophenol, SPLP	ug/L				
2-Methylnaphthalene, SPLP	ug/L				
2-Methylnaphthalene	ug/kg	370	U	400	U
2-Methylphenol (o-Cresol), SPLP	ug/L				
2-Methylphenol (o-Cresol)	ug/kg	370	U	400	U
2-Nitroaniline, SPLP	ug/L				
2-Nitrophenol, SPLP	ug/L				
3,3'-Dichlorobenzidine, SPLP	ug/L				
3-Nitroaniline, SPLP	ug/L				
4,6-Dinitro-2-Methylphenol, SPLP	ug/L				
4-Bromophenyl Phenyl Ether, SPLP	ug/L				
4-Chloro-3-Methylphenol, SPLP	ug/L				
4-Chloroaniline, SPLP	ug/L				
4-Chlorophenyl Phenyl Ether, SPLP	ug/L				
4-Nitroaniline, SPLP	ug/L				
4-Nitrophenol, SPLP	ug/L				
Benzoic Acid, SPLP	ug/L				
Benzyl Alcohol, SPLP	ug/L				
Benzyl Butyl Phthalate, SPLP	ug/L				
Bis(2-Chloroethoxy) Methane, SPLP	ug/L				
Bis(2-Ethylhexyl) Phthalate, SPLP	ug/L				
Di-N-Butyl Phthalate, SPLP	ug/L				
Di-N-Octylphthalate, SPLP	ug/L				
Dibenzofuran, SPLP	ug/L				
Diethyl Phthalate, SPLP	ug/L				
Dimethyl Phthalate, SPLP	ug/L				
Hexachlorobenzene, SPLP	ug/L				
Hexachlorobutadiene, SPLP	ug/L				
Hexachlorocyclopentadiene, SPLP	ug/L				
Hexachloroethane, SPLP	ug/L				
Isophorone, SPLP	ug/L				
N-Nitrosodi-N-Propylamine, SPLP	ug/L				
N-Nitrosodiphenylamine, SPLP	ug/L				
Nitrobenzene, SPLP	ug/L				
Pentachlorophenol, SPLP	ug/L				
Phenol, SPLP	ug/L				
Phenol	ug/kg	370	U	400	U
Acenaphthylene, SPLP	ug/L				
Acenaphthylene	ug/kg	370	U	400	U

Soil SVOCs

	StationID	F619SB001		F619SB001		F619SB001		F619SB001	
	SampleID	619SB001S1 (0-1ft)		619SB001S2 (3-5ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/22/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Bis(2-Chloroethyl) Ether, SPLP	ug/L	5	U	5	U				
Bis(2-Chloroethyl) Ether	ug/kg					400	U	390	U
2-Chlorophenol	ug/kg					400	U	390	U
Acenaphthene, SPLP	ug/L	5	U	5	U				
Acenaphthene	ug/kg					400	U	390	U
1,3-Dichlorobenzene	ug/kg					400	U	390	U
Fluorene, SPLP	ug/L	5	U	5	U				
Fluorene	ug/kg					400	U	390	U
1,4-Dichlorobenzene	ug/kg					400	U	390	U
Phenanthrene, SPLP	ug/L	5	U	5	U				
Phenanthrene	ug/kg					400	U	390	U
Anthracene, SPLP	ug/L	5	U	5	U				
Anthracene	ug/kg					400	U	390	U
Benzyl Alcohol	ug/kg					400	U	390	U
Fluoranthene, SPLP	ug/L	5	U	5	U				
Fluoranthene	ug/kg					400	U	390	U
1,2-Dichlorobenzene	ug/kg					400	U	390	U
Pyrene, SPLP	ug/L	5	U	5	U				
Pyrene	ug/kg					100	J	390	U
Benzo(a)Anthracene, SPLP	ug/L	5	U	5	U				
Benzo(a)Anthracene	ug/kg					400	U	390	U
Chrysene, SPLP	ug/L	5	U	5	U				
Chrysene	ug/kg					400	U	390	U
enzo(b)Fluoranthene, SPLP	ug/L	5	U	5	U				
enzo(b)Fluoranthene	ug/kg					400	U	390	U
N-Nitrosodi-N-Propylamine	ug/kg					400	U	390	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	5	U				
4-Methylphenol (p-Cresol)	ug/kg					400	U	390	U
Benzo(k)Fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(k)Fluoranthene	ug/kg					400	U	390	U
Benzo(a)Pyrene, SPLP	ug/L	5	U	5	U				
Benzo(a)Pyrene	ug/kg					400	U	390	U
Hexachloroethane	ug/kg					400	U	390	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L	5	U	5	U				
Indeno(1,2,3-c,d)Pyrene	ug/kg					400	U	390	U
Nitrobenzene	ug/kg					400	U	390	U
Dibenz(a,h)Anthracene, SPLP	ug/L	5	U	5	U				
Dibenz(a,h)Anthracene	ug/kg					400	U	390	U
Isophorone	ug/kg					400	U	390	U
2-Nitrophenol	ug/kg					400	U	390	U
Benzo(g,h,i)Perylene, SPLP	ug/L	5	U	5	U				
Benzo(g,h,i)Perylene	ug/kg					400	U	390	U
2,4-Dimethylphenol	ug/kg					400	U	390	U
Bis(2-Chloroethoxy) Methane	ug/kg					400	U	390	U
Benzoic Acid	ug/kg					2000	UJ	1900	UJ
2,4-Dichlorophenol	ug/kg					400	U	390	U
1,2,4-Trichlorobenzene	ug/kg					400	U	390	U
4-Chloroaniline	ug/kg					400	U	390	U
Hexachlorobutadiene	ug/kg					400	U	390	U
4-Chloro-3-Methylphenol	ug/kg					400	U	390	U
Hexachlorocyclopentadiene	ug/kg					400	U	390	U
4,6-Trichlorophenol	ug/kg					400	U	390	U
.,4,5-Trichlorophenol	ug/kg					400	U	390	U

Soil SVOCs

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/25/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Bis(2-Chloroethyl) Ether, SPLP	ug/L	5	U	5	U				
Bis(2-Chloroethyl) Ether	ug/kg					380	U	530	U
2-Chlorophenol	ug/kg					380	U	530	U
Acenaphthene, SPLP	ug/L	5	U	5	U				
Acenaphthene	ug/kg					380	U	530	U
1,3-Dichlorobenzene	ug/kg					380	U	530	U
Fluorene, SPLP	ug/L	5	U	5	U				
Fluorene	ug/kg					380	U	530	U
1,4-Dichlorobenzene	ug/kg					380	U	530	U
Phenanthrene, SPLP	ug/L	5	U	5	U				
Phenanthrene	ug/kg					380	U	530	U
Anthracene, SPLP	ug/L	5	U	5	U				
Anthracene	ug/kg					380	U	530	U
Benzyl Alcohol	ug/kg					380	U	530	U
Fluoranthene, SPLP	ug/L	5	U	5	U				
Fluoranthene	ug/kg					380	U	130	J
1,2-Dichlorobenzene	ug/kg					380	U	530	U
Pyrene, SPLP	ug/L	5	U	5	U				
Pyrene	ug/kg					380	U	160	J
Benzo(a)Anthracene, SPLP	ug/L	5	U	5	U				
Benzo(a)Anthracene	ug/kg					380	U	530	U
Chrysene, SPLP	ug/L	5	U	5	U				
Chrysene	ug/kg					380	U	530	U
Benzo(b)Fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(b)Fluoranthene	ug/kg					380	U	530	U
N-Nitrosodi-N-Propylamine	ug/kg					380	U	530	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	5	U				
4-Methylphenol (p-Cresol)	ug/kg					380	U	530	U
Benzo(k)Fluoranthene, SPLP	ug/L	5	U	5	U				
Benzo(k)Fluoranthene	ug/kg					380	U	530	U
Benzo(a)Pyrene, SPLP	ug/L	5	U	5	U				
Benzo(a)Pyrene	ug/kg					380	U	530	U
Hexachloroethane	ug/kg					380	U	530	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L	5	U	5	U				
Indeno(1,2,3-c,d)Pyrene	ug/kg					380	U	530	U
Nitrobenzene	ug/kg					380	U	530	U
Dibenz(a,h)Anthracene, SPLP	ug/L	5	U	5	U				
Dibenz(a,h)Anthracene	ug/kg					380	U	530	U
Isophorone	ug/kg					380	U	530	U
2-Nitrophenol	ug/kg					380	U	530	U
Benzo(g,h,i)Perylene, SPLP	ug/L	5	U	5	U				
Benzo(g,h,i)Perylene	ug/kg					380	U	530	U
2,4-Dimethylphenol	ug/kg					380	U	530	U
Bis(2-Chloroethoxy) Methane	ug/kg					380	U	530	U
Benzoic Acid	ug/kg					1900	UJ	2600	UJ
2,4-Dichlorophenol	ug/kg					380	U	530	U
1,2,4-Trichlorobenzene	ug/kg					380	U	530	U
4-Chloroaniline	ug/kg					380	U	530	U
Hexachlorobutadiene	ug/kg					380	U	530	U
4-Chloro-3-Methylphenol	ug/kg					380	U	530	U
Hexachlorocyclopentadiene	ug/kg					380	U	530	U
2,4,6-Trichlorophenol	ug/kg					380	U	530	U
2,4,5-Trichlorophenol	ug/kg					380	U	530	U

Soil SVOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/26/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
Bis(2-Chloroethyl) Ether, SPLP	ug/L	5	U	6	U				
Bis(2-Chloroethyl) Ether	ug/kg					370	U	510	U
2-Chlorophenol	ug/kg					370	U	510	U
Acenaphthene, SPLP	ug/L	5	U	6	U				
Acenaphthene	ug/kg					370	U	510	U
1,3-Dichlorobenzene	ug/kg					370	U	510	U
Fluorene, SPLP	ug/L	5	U	6	U				
Fluorene	ug/kg					370	U	510	U
1,4-Dichlorobenzene	ug/kg					370	U	510	U
Phenanthrene, SPLP	ug/L	5	U	6	U				
Phenanthrene	ug/kg					370	U	510	U
Anthracene, SPLP	ug/L	5	U	6	U				
Anthracene	ug/kg					370	U	510	U
Benzyl Alcohol	ug/kg					370	U	510	U
Fluoranthene, SPLP	ug/L	5	U	6	U				
Fluoranthene	ug/kg					370	U	130	J
1,2-Dichlorobenzene	ug/kg					370	U	510	U
Pyrene, SPLP	ug/L	5	U	6	U				
Pyrene	ug/kg					76	J	150	J
Benzo(a)Anthracene, SPLP	ug/L	5	U	6	U				
Benzo(a)Anthracene	ug/kg					370	U	510	U
Chrysene, SPLP	ug/L	5	U	6	U				
Chrysene	ug/kg					370	U	110	J
Benzo(b)Fluoranthene, SPLP	ug/L	5	U	6	U				
Benzo(b)Fluoranthene	ug/kg					370	U	510	U
N-Nitrosodi-N-Propylamine	ug/kg					370	U	510	U
4-Methylphenol (p-Cresol), SPLP	ug/L	5	U	6	U				
4-Methylphenol (p-Cresol)	ug/kg					370	U	510	U
Benzo(k)Fluoranthene, SPLP	ug/L	5	U	6	U				
Benzo(k)Fluoranthene	ug/kg					370	U	510	U
Benzo(a)Pyrene, SPLP	ug/L	5	U	6	U				
Benzo(a)Pyrene	ug/kg					370	U	510	U
Hexachloroethane	ug/kg					370	U	510	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L	5	U	6	U				
Indeno(1,2,3-c,d)Pyrene	ug/kg					370	U	510	U
Nitrobenzene	ug/kg					370	U	510	U
Dibenz(a,h)Anthracene, SPLP	ug/L	5	U	6	U				
Dibenz(a,h)Anthracene	ug/kg					370	U	510	U
Isophorone	ug/kg					370	U	510	U
2-Nitrophenol	ug/kg					370	U	510	U
Benzo(g,h,i)Perylene, SPLP	ug/L	5	U	6	U				
Benzo(g,h,i)Perylene	ug/kg					370	U	510	U
2,4-Dimethylphenol	ug/kg					370	U	510	U
Bis(2-Chloroethoxy) Methane	ug/kg					370	U	510	U
Benzoic Acid	ug/kg					1900	UJ	2500	UJ
2,4-Dichlorophenol	ug/kg					370	U	510	U
1,2,4-Trichlorobenzene	ug/kg					370	U	510	U
4-Chloroaniline	ug/kg					370	U	510	U
Hexachlorobutadiene	ug/kg					370	U	510	U
4-Chloro-3-Methylphenol	ug/kg					370	U	510	U
Hexachlorocyclopentadiene	ug/kg					370	U	510	U
2,4,6-Trichlorophenol	ug/kg					370	U	510	U
2,4,5-Trichlorophenol	ug/kg					370	U	510	U

Soil SVOCs

	StationID	F619SB016		F619SB016		F619SB017		F619SB017	
	SampleID	619SB01601 (0-1ft)		619SB01602 (3-5ft)		619SB01701 (0-1ft)		619SB01702 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/15/1999		10/15/1999	
	DateAnalyzed	10/29/1999		10/28/1999		10/28/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	Units								
Bis(2-Chloroethyl) Ether, SPLP	ug/L								
Bis(2-Chloroethyl) Ether	ug/kg	410	U	470	U	370	U	410	U
2-Chlorophenol	ug/kg	410	U	470	U	370	U	410	U
Acenaphthene, SPLP	ug/L								
Acenaphthene	ug/kg	410	U	470	U	370	U	410	U
1,3-Dichlorobenzene	ug/kg	410	U	470	U	370	U	410	U
Fluorene, SPLP	ug/L								
Fluorene	ug/kg	410	U	470	U	370	U	410	U
1,4-Dichlorobenzene	ug/kg	410	U	470	U	370	U	410	U
Phenanthrene, SPLP	ug/L								
Phenanthrene	ug/kg	410	U	470	U	120	J	410	U
Anthracene, SPLP	ug/L								
Anthracene	ug/kg	410	U	470	U	370	U	410	U
Benzyl Alcohol	ug/kg	410	U	470	U	370	U	410	U
Fluoranthene, SPLP	ug/L								
Fluoranthene	ug/kg	410	U	150	J	150	J	410	U
1,2-Dichlorobenzene	ug/kg	410	U	470	U	370	U	410	U
Pyrene, SPLP	ug/L								
Pyrene	ug/kg	410	U	140	J	140	J	410	U
Benzo(a)Anthracene, SPLP	ug/L								
Benzo(a)Anthracene	ug/kg	410	U	470	U	99	J	410	U
Chrysene, SPLP	ug/L								
Chrysene	ug/kg	410	U	120	J	130	J	410	U
Benzo(b)Fluoranthene, SPLP	ug/L								
Benzo(b)Fluoranthene	ug/kg	410	U	96	J	130	J	410	U
N-Nitrosodi-N-Propylamine	ug/kg	410	U	470	U	370	U	410	U
4-Methylphenol (p-Cresol), SPLP	ug/L								
4-Methylphenol (p-Cresol)	ug/kg	410	U	470	U	370	U	410	U
Benzo(k)Fluoranthene, SPLP	ug/L								
Benzo(k)Fluoranthene	ug/kg	410	U	120	J	83	J	410	U
Benzo(a)Pyrene, SPLP	ug/L								
Benzo(a)Pyrene	ug/kg	410	U	100	J	94	J	410	U
Hexachloroethane	ug/kg	410	U	470	U	370	U	410	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L								
Indeno(1,2,3-c,d)Pyrene	ug/kg	410	U	470	U	370	U	410	U
Nitrobenzene	ug/kg	410	U	470	U	370	U	410	U
Dibenz(a,h)Anthracene, SPLP	ug/L								
Dibenz(a,h)Anthracene	ug/kg	410	U	470	U	370	U	410	U
Isophorone	ug/kg	410	U	470	U	370	U	410	U
2-Nitrophenol	ug/kg	410	U	470	U	370	U	410	U
Benzo(g,h,i)Perylene, SPLP	ug/L								
Benzo(g,h,i)Perylene	ug/kg	410	U	470	U	370	U	410	U
2,4-Dimethylphenol	ug/kg	410	U	470	U	370	U	410	U
Bis(2-Chloroethoxy) Methane	ug/kg	410	U	470	U	370	U	410	U
Benzoic Acid	ug/kg	2000	U	2300	U	1900	U	2000	U
2,4-Dichlorophenol	ug/kg	410	U	470	U	370	U	410	U
1,2,4-Trichlorobenzene	ug/kg	410	U	470	U	370	U	410	U
4-Chloroaniline	ug/kg	410	U	470	U	370	U	410	U
Hexachlorobutadiene	ug/kg	410	U	470	U	370	U	410	U
4-Chloro-3-Methylphenol	ug/kg	410	U	470	U	370	U	410	U
Hexachlorocyclopentadiene	ug/kg	410	U	470	U	370	U	410	U
2,4,6-Trichlorophenol	ug/kg	410	U	470	U	370	U	410	U
2,4,5-Trichlorophenol	ug/kg	410	U	470	U	370	U	410	U

Soil SVOCs

	StationID	F619SB018		F619SB018		F619SB019		F619SB019	
	SampleID	619SB01801 (0-1ft)		619SB01802 (3-5ft)		619SB01901 (0-1ft)		619SB01902 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/16/1999		10/16/1999	
	DateAnalyzed	10/28/1999		10/28/1999		10/29/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN025		EN025	
Parameter	Units								
Bis(2-Chloroethyl) Ether, SPLP	ug/L								
Bis(2-Chloroethyl) Ether	ug/kg	360	U	400	U	360	U	470	U
2-Chlorophenol	ug/kg	360	U	400	U	360	U	470	U
Acenaphthene, SPLP	ug/L								
Acenaphthene	ug/kg	360	U	400	U	360	U	470	U
1,3-Dichlorobenzene	ug/kg	360	U	400	U	360	U	470	U
Fluorene, SPLP	ug/L								
Fluorene	ug/kg	360	U	400	U	360	U	470	U
1,4-Dichlorobenzene	ug/kg	360	U	400	U	360	U	470	U
Phenanthrene, SPLP	ug/L								
Phenanthrene	ug/kg	360	U	400	U	360	U	470	U
Anthracene, SPLP	ug/L								
Anthracene	ug/kg	360	U	400	U	360	U	470	U
Benzyl Alcohol	ug/kg	360	U	400	U	360	U	470	U
Fluoranthene, SPLP	ug/L								
Fluoranthene	ug/kg	360	U	400	U	360	U	150	J
1,2-Dichlorobenzene	ug/kg	360	U	400	U	360	U	470	U
Pyrene, SPLP	ug/L								
Pyrene	ug/kg	360	U	400	U	360	U	190	J
Benzo(a)Anthracene, SPLP	ug/L								
Benzo(a)Anthracene	ug/kg	360	U	400	U	360	U	470	U
Chrysene, SPLP	ug/L								
Chrysene	ug/kg	360	U	400	U	360	U	470	U
Benzo(b)Fluoranthene, SPLP	ug/L								
Benzo(b)Fluoranthene	ug/kg	360	U	400	U	360	U	470	U
N-Nitrosodi-N-Propylamine	ug/kg	360	U	400	U	360	U	470	U
4-Methylphenol (p-Cresol), SPLP	ug/L								
4-Methylphenol (p-Cresol)	ug/kg	360	U	400	U	360	U	470	U
Benzo(k)Fluoranthene, SPLP	ug/L								
Benzo(k)Fluoranthene	ug/kg	360	U	400	U	360	U	470	U
Benzo(a)Pyrene, SPLP	ug/L								
Benzo(a)Pyrene	ug/kg	360	U	400	U	360	U	470	U
Hexachloroethane	ug/kg	360	U	400	U	360	U	470	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L								
Indeno(1,2,3-c,d)Pyrene	ug/kg	360	U	400	U	360	U	470	U
Nitrobenzene	ug/kg	360	U	400	U	360	U	470	U
Dibenz(a,h)Anthracene, SPLP	ug/L								
Dibenz(a,h)Anthracene	ug/kg	360	U	400	U	360	U	470	U
Isophorone	ug/kg	360	U	400	U	360	U	470	U
2-Nitrophenol	ug/kg	360	U	400	U	360	U	470	U
Benzo(g,h,i)Perylene, SPLP	ug/L								
Benzo(g,h,i)Perylene	ug/kg	360	U	400	U	360	U	470	U
2,4-Dimethylphenol	ug/kg	360	U	400	U	360	U	470	U
Bis(2-Chloroethoxy) Methane	ug/kg	360	U	400	U	360	U	470	U
Benzoic Acid	ug/kg	1800	U	2000	U	1800	U	100	J
2,4-Dichlorophenol	ug/kg	360	U	400	U	360	U	470	U
1,2,4-Trichlorobenzene	ug/kg	360	U	400	U	360	U	470	U
4-Chloroaniline	ug/kg	360	U	400	U	360	U	470	U
Hexachlorobutadiene	ug/kg	360	U	400	U	360	U	470	U
4-Chloro-3-Methylphenol	ug/kg	360	U	400	U	360	U	470	U
Hexachlorocyclopentadiene	ug/kg	360	U	400	U	360	U	470	U
2,4,6-Trichlorophenol	ug/kg	360	U	400	U	360	U	470	U
2,4,5-Trichlorophenol	ug/kg	360	U	400	U	360	U	470	U

Soil SVOCs

	StationID	F619SB020		F619SB020	
	SampleID	619SB02001 (0-1ft)		619SB02002 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999	
	DateAnalyzed	10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023	
Parameter	Units				
Bis(2-Chloroethyl) Ether, SPLP	ug/L				
Bis(2-Chloroethyl) Ether	ug/kg	370	U	400	U
2-Chlorophenol	ug/kg	370	U	400	U
Acenaphthene, SPLP	ug/L				
Acenaphthene	ug/kg	370	U	400	U
1,3-Dichlorobenzene	ug/kg	370	U	400	U
Fluorene, SPLP	ug/L				
Fluorene	ug/kg	370	U	400	U
1,4-Dichlorobenzene	ug/kg	370	U	400	U
Phenanthrene, SPLP	ug/L				
Phenanthrene	ug/kg	370	U	400	U
Anthracene, SPLP	ug/L				
Anthracene	ug/kg	370	U	400	U
Benzyl Alcohol	ug/kg	370	U	400	U
Fluoranthene, SPLP	ug/L				
Fluoranthene	ug/kg	370	U	400	U
1,2-Dichlorobenzene	ug/kg	370	U	400	U
Pyrene, SPLP	ug/L				
Pyrene	ug/kg	370	U	400	U
Benzo(a)Anthracene, SPLP	ug/L				
Benzo(a)Anthracene	ug/kg	370	U	400	U
Chrysene, SPLP	ug/L				
Chrysene	ug/kg	370	U	400	U
Benzo(b)Fluoranthene, SPLP	ug/L				
Benzo(b)Fluoranthene	ug/kg	370	U	400	U
N-Nitrosodi-N-Propylamine	ug/kg	370	U	400	U
4-Methylphenol (p-Cresol), SPLP	ug/L				
4-Methylphenol (p-Cresol)	ug/kg	370	U	400	U
Benzo(k)Fluoranthene, SPLP	ug/L				
Benzo(k)Fluoranthene	ug/kg	370	U	400	U
Benzo(a)Pyrene, SPLP	ug/L				
Benzo(a)Pyrene	ug/kg	370	U	400	U
Hexachloroethane	ug/kg	370	U	400	U
Indeno(1,2,3-c,d)Pyrene, SPLP	ug/L				
Indeno(1,2,3-c,d)Pyrene	ug/kg	370	U	400	U
Nitrobenzene	ug/kg	370	U	400	U
Dibenz(a,h)Anthracene, SPLP	ug/L				
Dibenz(a,h)Anthracene	ug/kg	370	U	400	U
Isophorone	ug/kg	370	U	400	U
2-Nitrophenol	ug/kg	370	U	400	U
Benzo(g,h,i)Perylene, SPLP	ug/L				
Benzo(g,h,i)Perylene	ug/kg	370	U	400	U
2,4-Dimethylphenol	ug/kg	370	U	400	U
Bis(2-Chloroethoxy) Methane	ug/kg	370	U	400	U
Benzoic Acid	ug/kg	1900	U	2000	U
2,4-Dichlorophenol	ug/kg	370	U	400	U
1,2,4-Trichlorobenzene	ug/kg	370	U	400	U
4-Chloroaniline	ug/kg	370	U	400	U
Hexachlorobutadiene	ug/kg	370	U	400	U
4-Chloro-3-Methylphenol	ug/kg	370	U	400	U
Hexachlorocyclopentadiene	ug/kg	370	U	400	U
2,4,6-Trichlorophenol	ug/kg	370	U	400	U
2,4,5-Trichlorophenol	ug/kg	370	U	400	U

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Soil SVOCs

	StationID	F619SB001	F619SB001	F619SB001		F619SB001	
	SampleID	619SB001S1 (0-1ft)	619SB001S2 (3-5ft)	619SB001T1 (0-1ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999	10/14/1999	10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999	10/22/1999	10/21/1999		10/21/1999	
	SDGNumber	EN020	EN020	EN020		EN020	
Parameter	**Units**						
2-Chloronaphthalene	ug/kg			400	U	390	U
2-Nitroaniline	ug/kg			400	U	390	U
2,6-Dinitrotoluene	ug/kg			400	U	390	U
3-Nitroaniline	ug/kg			400	U	390	U
2,4-Dinitrophenol	ug/kg			800	U	780	U
Dibenzofuran	ug/kg			400	U	390	U
4-Nitrophenol	ug/kg			800	U	780	U
2,4-Dinitrotoluene	ug/kg			400	U	390	U
Dimethyl Phthalate	ug/kg			400	U	390	U
Diethyl Phthalate	ug/kg			400	U	390	U
4-Chlorophenyl Phenyl Ether	ug/kg			400	U	390	U
4-Nitroaniline	ug/kg			400	U	390	U
4,6-Dinitro-2-Methylphenol	ug/kg			800	U	780	U
N-Nitrosodiphenylamine	ug/kg			400	U	390	U
4-Bromophenyl Phenyl Ether	ug/kg			400	U	390	U
Hexachlorobenzene	ug/kg			400	U	390	U
Pentachlorophenol	ug/kg			800	U	780	U
Di-N-Butyl Phthalate	ug/kg			400	U	390	U
Benzyl Butyl Phthalate	ug/kg			400	U	390	U
3,3'-Dichlorobenzidine	ug/kg			800	U	780	U
Bis(2-Ethylhexyl) Phthalate	ug/kg			400	U	390	U
Di-N-Octylphthalate	ug/kg			400	U	390	U

Soil SVOCs

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/25/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
2-Chloronaphthalene	ug/kg					380	U	530	U
2-Nitroaniline	ug/kg					380	U	530	U
2,6-Dinitrotoluene	ug/kg					380	U	530	U
3-Nitroaniline	ug/kg					380	U	530	U
2,4-Dinitrophenol	ug/kg					770	U	1100	U
Dibenzofuran	ug/kg					380	U	530	U
4-Nitrophenol	ug/kg					770	U	1100	U
2,4-Dinitrotoluene	ug/kg					380	U	530	U
Dimethyl Phthalate	ug/kg					380	U	530	U
Diethyl Phthalate	ug/kg					380	U	530	U
4-Chlorophenyl Phenyl Ether	ug/kg					380	U	530	U
4-Nitroaniline	ug/kg					380	U	530	U
4,6-Dinitro-2-Methylphenol	ug/kg					770	U	1100	U
N-Nitrosodiphenylamine	ug/kg					380	U	530	U
4-Bromophenyl Phenyl Ether	ug/kg					380	U	530	U
Hexachlorobenzene	ug/kg					380	U	530	U
Pentachlorophenol	ug/kg					770	U	1100	U
Di-N-Butyl Phthalate	ug/kg					380	U	530	U
Benzyl Butyl Phthalate	ug/kg					380	U	530	U
3,3'-Dichlorobenzidine	ug/kg					770	U	1100	U
Bis(2-Ethylhexyl) Phthalate	ug/kg					380	U	530	U
Di-N-Octylphthalate	ug/kg					380	U	530	U

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Soil SVOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/25/1999		10/26/1999		10/21/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	**Units**								
2-Chloronaphthalene	ug/kg					370	U	510	U
2-Nitroaniline	ug/kg					370	U	510	U
2,6-Dinitrotoluene	ug/kg					370	U	510	U
3-Nitroaniline	ug/kg					370	U	510	U
2,4-Dinitrophenol	ug/kg					750	U	1000	U
Dibenzofuran	ug/kg					370	U	510	U
4-Nitrophenol	ug/kg					750	U	1000	U
2,4-Dinitrotoluene	ug/kg					370	U	510	U
Dimethyl Phthalate	ug/kg					370	U	510	U
Diethyl Phthalate	ug/kg					370	U	510	U
4-Chlorophenyl Phenyl Ether	ug/kg					370	U	510	U
4-Nitroaniline	ug/kg					370	U	510	U
4,6-Dinitro-2-Methylphenol	ug/kg					750	U	1000	U
N-Nitrosodiphenylamine	ug/kg					370	U	510	U
4-Bromophenyl Phenyl Ether	ug/kg					370	U	510	U
Hexachlorobenzene	ug/kg					370	U	510	U
Pentachlorophenol	ug/kg					750	U	1000	U
Di-N-Butyl Phthalate	ug/kg					370	U	510	U
Benzyl Butyl Phthalate	ug/kg					370	U	510	U
3,3'-Dichlorobenzidine	ug/kg					750	U	1000	U
Bis(2-Ethylhexyl) Phthalate	ug/kg					430	U	510	U
Di-N-Octylphthalate	ug/kg					370	U	510	U

Soil SVOCs

	StationID	F619SB016		F619SB016		F619SB017		F619SB017	
	SampleID	619SB01601 (0-1ft)		619SB01602 (3-5ft)		619SB01701 (0-1ft)		619SB01702 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/15/1999		10/15/1999	
	DateAnalyzed	10/29/1999		10/28/1999		10/28/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN023		EN023	
Parameter	Units								
2-Chloronaphthalene	ug/kg	410	U	470	U	370	U	410	U
2-Nitroaniline	ug/kg	410	U	470	U	370	U	410	U
2,6-Dinitrotoluene	ug/kg	410	U	470	U	370	U	410	U
3-Nitroaniline	ug/kg	410	U	470	U	370	U	410	U
2,4-Dinitrophenol	ug/kg	810	U	940	U	750	U	810	U
Dibenzofuran	ug/kg	410	U	470	U	370	U	410	U
4-Nitrophenol	ug/kg	810	U	940	U	750	U	810	U
2,4-Dinitrotoluene	ug/kg	410	U	470	U	370	U	410	U
Dimethyl Phthalate	ug/kg	410	U	470	U	370	U	410	U
Diethyl Phthalate	ug/kg	410	U	470	U	370	U	410	U
4-Chlorophenyl Phenyl Ether	ug/kg	410	U	470	U	370	U	410	U
4-Nitroaniline	ug/kg	410	U	470	U	370	U	410	U
4,6-Dinitro-2-Methylphenol	ug/kg	810	U	940	U	750	U	810	U
N-Nitrosodiphenylamine	ug/kg	410	U	470	U	370	U	410	U
4-Bromophenyl Phenyl Ether	ug/kg	410	U	470	U	370	U	410	U
Hexachlorobenzene	ug/kg	410	U	470	U	370	U	410	U
Pentachlorophenol	ug/kg	810	U	940	U	750	U	810	U
Di-N-Butyl Phthalate	ug/kg	410	U	470	U	370	U	410	U
Benzyl Butyl Phthalate	ug/kg	410	U	470	U	370	U	410	U
3,3'-Dichlorobenzidine	ug/kg	810	U	940	U	750	U	810	U
Bis(2-Ethylhexyl) Phthalate	ug/kg	410	U	470	U	230	J	250	J
Di-N-Octylphthalate	ug/kg	410	U	470	U	370	U	410	U

Soil SVOCs

	StationID	F619SB018		F619SB018		F619SB019		F619SB019	
	SampleID	619SB01801 (0-1ft)		619SB01802 (3-5ft)		619SB01901 (0-1ft)		619SB01902 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/16/1999		10/16/1999	
	DateAnalyzed	10/28/1999		10/28/1999		10/29/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN025		EN025	
Parameter	Units								
2-Chloronaphthalene	ug/kg	360	U	400	U	360	U	470	U
2-Nitroaniline	ug/kg	360	U	400	U	360	U	470	U
2,6-Dinitrotoluene	ug/kg	360	U	400	U	360	U	470	U
3-Nitroaniline	ug/kg	360	U	400	U	360	U	470	U
2,4-Dinitrophenol	ug/kg	720	U	790	U	720	U	940	U
Dibenzofuran	ug/kg	360	U	400	U	360	U	470	U
4-Nitrophenol	ug/kg	720	U	790	U	720	U	940	U
2,4-Dinitrotoluene	ug/kg	360	U	400	U	360	U	470	U
Dimethyl Phthalate	ug/kg	360	U	400	U	360	U	470	U
Diethyl Phthalate	ug/kg	360	U	400	U	360	U	470	U
4-Chlorophenyl Phenyl Ether	ug/kg	360	U	400	U	360	U	470	U
4-Nitroaniline	ug/kg	360	U	400	U	360	U	470	U
4,6-Dinitro-2-Methylphenol	ug/kg	720	U	790	U	720	U	940	U
N-Nitrosodiphenylamine	ug/kg	360	U	400	U	360	U	470	U
4-Bromophenyl Phenyl Ether	ug/kg	360	U	400	U	360	U	470	U
Hexachlorobenzene	ug/kg	360	U	400	U	360	U	470	U
Pentachlorophenol	ug/kg	720	U	790	U	720	U	940	U
Di-N-Butyl Phthalate	ug/kg	360	U	400	U	360	U	470	U
Benzyl Butyl Phthalate	ug/kg	360	U	400	U	360	U	470	U
3,3'-Dichlorobenzidine	ug/kg	720	U	790	U	720	U	940	U
Bis(2-Ethylhexyl) Phthalate	ug/kg	360	U	400	U	360	U	470	U
Di-N-Octylphthalate	ug/kg	360	U	400	U	360	U	470	U

Soil SVOCs

	StationID	F619SB020		F619SB020	
	SampleID	619SB02001 (0-1ft)		619SB02002 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999	
	DateAnalyzed	10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023	
Parameter	Units				
2-Chloronaphthalene	ug/kg	370	U	400	U
2-Nitroaniline	ug/kg	370	U	400	U
2,6-Dinitrotoluene	ug/kg	370	U	400	U
3-Nitroaniline	ug/kg	370	U	400	U
2,4-Dinitrophenol	ug/kg	750	U	800	U
Dibenzofuran	ug/kg	370	U	400	U
4-Nitrophenol	ug/kg	750	U	800	U
2,4-Dinitrotoluene	ug/kg	370	U	400	U
Dimethyl Phthalate	ug/kg	370	U	400	U
Diethyl Phthalate	ug/kg	370	U	400	U
4-Chlorophenyl Phenyl Ether	ug/kg	370	U	400	U
4-Nitroaniline	ug/kg	370	U	400	U
4,6-Dinitro-2-Methylphenol	ug/kg	750	U	800	U
N-Nitrosodiphenylamine	ug/kg	370	U	400	U
4-Bromophenyl Phenyl Ether	ug/kg	370	U	400	U
Hexachlorobenzene	ug/kg	370	U	400	U
Pentachlorophenol	ug/kg	750	U	800	U
Di-N-Butyl Phthalate	ug/kg	370	U	400	U
Benzyl Butyl Phthalate	ug/kg	370	U	400	U
3,3'-Dichlorobenzidine	ug/kg	750	U	800	U
Bis(2-Ethylhexyl) Phthalate	ug/kg	370	U	260	J
Di-N-Octylphthalate	ug/kg	370	U	400	U

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Soil TPH

	StationID	GFDSSC036		GFDSSC036		GFDSSC036		GFDSSC036	
	SampleID	FDSSC03601 (0-1ft)		FDSSC03601 (0-1ft)		FDSSC03602 (3-5ft)		FDSSC03602 (3-5ft)	
	DateCollected	09/19/1996		09/19/1996		09/19/1996		09/19/1996	
	DateAnalyzed	09/30/1996		10/02/1996		09/30/1996		10/02/1996	
	SDGNumber	27016		27016		27016		27016	
Parameter	**Units**								
Diesel	mg/kg			2.85	U			3.77	U
Fuel oil no_ 6	mg/kg			2.85	U			3.77	U
Gasoline	ug/kg	14.2	U			15	J		
JP-4 C6-C14	mg/kg			2.85	U			3.77	U
Kerosene	mg/kg			2.85	U			3.77	U
Naptha C6-C12	mg/kg			2.85	U			3.77	U

Charleston Naval Complex
AOC 619, Zone F

Soil TPH

	StationID	GFDSSC037			GFDSSC037			GFDSSC037			GFDSSC037		
	SampleID	FDSSC03701 (0-1ft)			FDSSC03701 (0-1ft)			FDSSC03702 (3-5ft)			FDSSC03702 (3-5ft)		
	DateCollected	09/20/1996			09/20/1996			09/20/1996			09/20/1996		
	DateAnalyzed	09/26/1996			10/02/1996			09/26/1996			10/02/1996		
	SDGNumber	27034			27034			27034			27034		
Parameter	**Units**												
Diesel	mg/kg				2.69	U					4.18	U	
Fuel oil no_ 6	mg/kg				2.69	U					4 18	U	
Gasoline	ug/kg	23.8	=					20.3	J				
JP-4 C6-C14	mg/kg				2.69	U					4.18	U	
Kerosene	mg/kg				2.69	U					4 18	U	
Naptha C6-C12	mg/kg				2.69	U					4.18	U	

Charleston Naval Complex
AOC 619, Zone F

Soil TPH

	StationID	GFDSSC054		GFDSSC054	
	SampleID	FDSSC05401 (0-1ft)		FDSSC05401 (0-1ft)	
	DateCollected	09/23/1996		09/23/1996	
	DateAnalyzed	09/27/1996		10/11/1996	
	SDGNumber	27045		27045	
Parameter	**Units**				
Diesel	mg/kg			2.53	U
Fuel oil no_ 6	mg/kg			2.53	U
Gasoline	ug/kg	16.8	=		
JP-4 C6-C14	mg/kg			2.53	U
Kerosene	mg/kg			2.53	U
Naptha C6-C12	mg/kg			2.53	U

Soil VOCs

Parameter	Units	StationID	SampleID	DateCollected	DateAnalyzed	SDGNumber	Result	Qual
1,1,1-Trichloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,1,2,2-Tetrachloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,1,2-Trichloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,1-Dichloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,1-Dichloroethene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloroethene (Total), SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloropropane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
2-Chloroethyl Vinyl Ether, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	200	U
2-Hexanone, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	100	U
Acetone, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	100	R
Benzene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Bromodichloromethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Bromoform, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Bromomethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Carbon Disulfide, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Carbon Tetrachloride, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Chlorobenzene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Chloroethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Chloroform, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Chloromethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Cis-1,2-DICHLOROETHYLENE	ug/kg							
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Dibromochloromethane, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Methyl Ethyl Ketone, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	100	U
Methyl Isobutyl Ketone, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	100	U
Methylene Chloride, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Styrene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Tetrachloroethylene(Pce), SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Trichloroethylene (TCE), SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Vinyl Acetate, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Vinyl Chloride, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Benzene	ug/kg							
Chloromethane	ug/kg							
Naphthalene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/25/1999	EN020	5	U
Naphthalene	ug/kg							
Toluene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Toluene	ug/kg							
Vinyl Chloride	ug/kg							
Bromomethane	ug/kg							
Ethylbenzene, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Ethylbenzene	ug/kg							
Chloroethane	ug/kg							
1,1-Dichloroethene	ug/kg							
Methylene Chloride	ug/kg							
Xylenes, Total, SPLP	ug/L	F619SB001	619SB001S1 (0-1ft)	10/14/1999	10/19/1999	EN020	60	U
Xylenes, Total	ug/kg							
1,1-Dichloroethane	ug/kg							
Chloroform	ug/kg							
1,1,1-Trichloroethane	ug/kg							
Carbon Tetrachloride	ug/kg							
1,2-Dichloroethane	ug/kg							
1,1,1-Trichloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,1,2,2-Tetrachloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,1,2-Trichloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,1-Dichloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,1-Dichloroethene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloroethene (Total), SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
1,2-Dichloropropane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
2-Chloroethyl Vinyl Ether, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	200	U
2-Hexanone, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	100	U
Acetone, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	100	R
Benzene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Bromodichloromethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Bromoform, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Bromomethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Carbon Disulfide, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Carbon Tetrachloride, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Chlorobenzene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Chloroethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Chloroform, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Chloromethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Cis-1,2-DICHLOROETHYLENE	ug/kg							
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Dibromochloromethane, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Methyl Ethyl Ketone, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	100	U
Methyl Isobutyl Ketone, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	100	U
Methylene Chloride, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Styrene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Tetrachloroethylene(Pce), SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Trichloroethylene (TCE), SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Vinyl Acetate, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Vinyl Chloride, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Benzene	ug/kg							
Chloromethane	ug/kg							
Naphthalene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/22/1999	EN020	5	U
Naphthalene	ug/kg							
Toluene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Toluene	ug/kg							
Vinyl Chloride	ug/kg							
Bromomethane	ug/kg							
Ethylbenzene, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Ethylbenzene	ug/kg							
Chloroethane	ug/kg							
1,1-Dichloroethene	ug/kg							
Methylene Chloride	ug/kg							
Xylenes, Total, SPLP	ug/L	F619SB001	619SB001S2 (3-5ft)	10/14/1999	10/19/1999	EN020	60	U
Xylenes, Total	ug/kg							
1,1-Dichloroethane	ug/kg							
Chloroform	ug/kg							
1,1,1-Trichloroethane	ug/kg							
Carbon Tetrachloride	ug/kg							
1,2-Dichloroethane	ug/kg							

Soil VOCs

	StationID	F619SB001		F619SB001		F619SB001		F619SB001	
	SampleID	619SB001T1 (0-1ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/15/1999		10/21/1999		10/15/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,1,1-Trichloroethane, SPLP	ug/L								
1,1,2,2-Tetrachloroethane, SPLP	ug/L								
1,1,2-Trichloroethane, SPLP	ug/L								
1,1-Dichloroethane, SPLP	ug/L								
1,1-Dichloroethene, SPLP	ug/L								
1,2-Dichloroethane, SPLP	ug/L								
1,2-Dichloroethene (Total), SPLP	ug/L								
1,2-Dichloropropane, SPLP	ug/L								
2-Chloroethyl Vinyl Ether, SPLP	ug/L								
2-Hexanone, SPLP	ug/L								
Acetone, SPLP	ug/L								
Benzene, SPLP	ug/L								
Bromodichloromethane, SPLP	ug/L								
Bromoform, SPLP	ug/L								
Bromomethane, SPLP	ug/L								
Carbon Disulfide, SPLP	ug/L								
Carbon Tetrachloride, SPLP	ug/L								
Chlorobenzene, SPLP	ug/L								
Chloroethane, SPLP	ug/L								
Chloroform, SPLP	ug/L								
Chloromethane, SPLP	ug/L								
Cis-1,2-DICHLOROETHYLENE	ug/kg								
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L								
Dibromochloromethane, SPLP	ug/L								
2-Methyl Ethyl Ketone, SPLP	ug/L								
Methyl Isobutyl Ketone, SPLP	ug/L								
Methylene Chloride, SPLP	ug/L								
Styrene, SPLP	ug/L								
Tetrachloroethylene(Pce), SPLP	ug/L								
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L								
Trichloroethylene (TCE), SPLP	ug/L								
Vinyl Acetate, SPLP	ug/L								
Vinyl Chloride, SPLP	ug/L								
Benzene	ug/kg	4	U			3	U		
Chloromethane	ug/kg	4	U			3	U		
Naphthalene, SPLP	ug/L								
Naphthalene	ug/kg			400	U			390	U
Toluene, SPLP	ug/L								
Toluene	ug/kg	4	U			3	UJ		
Vinyl Chloride	ug/kg	4	U			3	U		
Bromomethane	ug/kg	4	U			3	U		
Ethylbenzene, SPLP	ug/L								
Ethylbenzene	ug/kg	4	U			3	UJ		
Chloroethane	ug/kg	4	U			3	U		
1,1-Dichloroethene	ug/kg	4	U			3	U		
Methylene Chloride	ug/kg	4	U			6	U		
Xylenes, Total, SPLP	ug/L								
Xylenes, Total	ug/kg	4	U			3	UJ		
1,1-Dichloroethane	ug/kg	4	U			3	U		
Chloroform	ug/kg	4	U			3	U		
1,1,1-Trichloroethane	ug/kg	4	U			3	U		
Carbon Tetrachloride	ug/kg	4	U			3	U		
1,2-Dichloroethane	ug/kg	4	U			3	U		

Soil VOCs

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004S1 (0-1ft)		619SB004S1 (0-1ft)		619SB004S2 (3-5ft)		619SB004S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/19/1999		10/25/1999		10/19/1999		10/25/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,1,1-Trichloroethane, SPLP	ug/L	60	U			60	U		
1,1,2,2-Tetrachloroethane, SPLP	ug/L	60	U			60	U		
1,1,2-Trichloroethane, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethane, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethene, SPLP	ug/L	60	U			60	U		
1,2-Dichloroethane, SPLP	ug/L	60	U			60	U		
1,2-Dichloroethene (Total), SPLP	ug/L	60	U			60	U		
1,2-Dichloropropane, SPLP	ug/L	60	U			60	U		
2-Chloroethyl Vinyl Ether, SPLP	ug/L	200	U			200	U		
2-Hexanone, SPLP	ug/L	100	U			100	U		
Acetone, SPLP	ug/L	100	R			100	R		
Benzene, SPLP	ug/L	60	U			60	U		
Bromodichloromethane, SPLP	ug/L	60	U			60	U		
Bromoform, SPLP	ug/L	60	U			60	U		
Bromomethane, SPLP	ug/L	60	U			60	U		
Carbon Disulfide, SPLP	ug/L	60	U			60	U		
Carbon Tetrachloride, SPLP	ug/L	60	U			60	U		
Chlorobenzene, SPLP	ug/L	60	U			60	U		
Chloroethane, SPLP	ug/L	60	U			60	U		
Chloroform, SPLP	ug/L	60	U			60	U		
Chloromethane, SPLP	ug/L	60	U			60	U		
Cis-1,2-DICHLOROETHYLENE	ug/kg								
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L	60	U			60	U		
Dibromochloromethane, SPLP	ug/L	60	U			60	U		
Methyl Ethyl Ketone, SPLP	ug/L	100	U			100	U		
Methyl Isobutyl Ketone, SPLP	ug/L	100	U			100	U		
Methylene Chloride, SPLP	ug/L	60	U			60	U		
Styrene, SPLP	ug/L	60	U			60	U		
Tetrachloroethylene(Pce), SPLP	ug/L	60	U			60	U		
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L	60	U			60	U		
Trichloroethylene (TCE), SPLP	ug/L	60	U			60	U		
Vinyl Acetate, SPLP	ug/L	60	U			60	U		
Vinyl Chloride, SPLP	ug/L	60	U			60	U		
Benzene	ug/kg								
Chloromethane	ug/kg								
Naphthalene, SPLP	ug/L			5	U			5	U
Naphthalene	ug/kg								
Toluene, SPLP	ug/L	60	U			60	U		
Toluene	ug/kg								
Vinyl Chloride	ug/kg								
Bromomethane	ug/kg								
Ethylbenzene, SPLP	ug/L	60	U			60	U		
Ethylbenzene	ug/kg								
Chloroethane	ug/kg								
1,1-Dichloroethene	ug/kg								
Methylene Chloride	ug/kg								
Xylenes, Total, SPLP	ug/L	60	U			60	U		
Xylenes, Total	ug/kg								
1,1-Dichloroethane	ug/kg								
Chloroform	ug/kg								
1,1,1-Trichloroethane	ug/kg								
Carbon Tetrachloride	ug/kg								
1,2-Dichloroethane	ug/kg								

Soil VOCs

Parameter	Units	StationID	SampleID	DateCollected	DateAnalyzed	SDGNumber	Result	Qual	Result	Qual	Result	Qual	Result	Qual
		F619SB004	619SB004T1 (0-1ft)	10/14/1999	10/15/1999	EN020			F619SB004	619SB004T1 (0-1ft)	10/14/1999	10/21/1999	EN020	
		F619SB004	619SB004T2 (3-5ft)	10/14/1999	10/15/1999	EN020			F619SB004	619SB004T2 (3-5ft)	10/14/1999	10/21/1999	EN020	
1,1,1-Trichloroethane, SPLP	ug/L													
1,1,2,2-Tetrachloroethane, SPLP	ug/L													
1,1,2-Trichloroethane, SPLP	ug/L													
1,1-Dichloroethane, SPLP	ug/L													
1,1-Dichloroethene, SPLP	ug/L													
1,2-Dichloroethane, SPLP	ug/L													
1,2-Dichloroethene (Total), SPLP	ug/L													
1,2-Dichloropropane, SPLP	ug/L													
2-Chloroethyl Vinyl Ether, SPLP	ug/L													
2-Hexanone, SPLP	ug/L													
Acetone, SPLP	ug/L													
Benzene, SPLP	ug/L													
Bromodichloromethane, SPLP	ug/L													
Bromoform, SPLP	ug/L													
Bromomethane, SPLP	ug/L													
Carbon Disulfide, SPLP	ug/L													
Carbon Tetrachloride, SPLP	ug/L													
Chlorobenzene, SPLP	ug/L													
Chloroethane, SPLP	ug/L													
Chloroform, SPLP	ug/L													
Chloromethane, SPLP	ug/L													
Cis-1,2-DICHLOROETHYLENE	ug/kg													
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L													
Dibromochloromethane, SPLP	ug/L													
Methyl Ethyl Ketone, SPLP	ug/L													
Methyl Isobutyl Ketone, SPLP	ug/L													
Methylene Chloride, SPLP	ug/L													
Styrene, SPLP	ug/L													
Tetrachloroethylene(Pce), SPLP	ug/L													
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L													
Trichloroethylene (TCE), SPLP	ug/L													
Vinyl Acetate, SPLP	ug/L													
Vinyl Chloride, SPLP	ug/L													
Benzene	ug/kg						3	R			5	U		
Chloromethane	ug/kg						3	R			5	U		
Naphthalene, SPLP	ug/L													
Naphthalene	ug/kg								380	U			530	U
Toluene, SPLP	ug/L													
Toluene	ug/kg						3	R			2	J		
Vinyl Chloride	ug/kg						3	R			5	U		
Bromomethane	ug/kg						3	R			5	U		
Ethylbenzene, SPLP	ug/L													
Ethylbenzene	ug/kg						3	R			5	U		
Chloroethane	ug/kg						3	R			5	U		
1,1-Dichloroethene	ug/kg						3	R			5	U		
Methylene Chloride	ug/kg						4	R			7	U		
Xylenes, Total, SPLP	ug/L													
Xylenes, Total	ug/kg						3	R			5	U		
1,1-Dichloroethane	ug/kg						3	R			5	U		
Chloroform	ug/kg						3	R			5	U		
1,1,1-Trichloroethane	ug/kg						3	R			5	U		
Carbon Tetrachloride	ug/kg						3	R			5	U		
1,2-Dichloroethane	ug/kg						3	R			5	U		

Soil VOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015S1 (0-1ft)		619SB015S1 (0-1ft)		619SB015S2 (3-5ft)		619SB015S2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/19/1999		10/25/1999		10/19/1999		10/26/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,1,1-Trichloroethane, SPLP	ug/L	60	U			60	U		
1,1,2,2-Tetrachloroethane, SPLP	ug/L	60	U			60	U		
1,1,2-Trichloroethane, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethane, SPLP	ug/L	60	U			60	U		
1,1-Dichloroethene, SPLP	ug/L	60	U			60	U		
1,2-Dichloroethane, SPLP	ug/L	60	U			60	U		
1,2-Dichloroethene (Total), SPLP	ug/L	60	U			60	U		
1,2-Dichloropropane, SPLP	ug/L	60	U			60	U		
2-Chloroethyl Vinyl Ether, SPLP	ug/L	200	U			200	U		
2-Hexanone, SPLP	ug/L	100	U			100	U		
Acetone, SPLP	ug/L	100	R			100	R		
Benzene, SPLP	ug/L	60	U			60	U		
Bromodichloromethane, SPLP	ug/L	60	U			60	U		
Bromoform, SPLP	ug/L	60	U			60	U		
Bromomethane, SPLP	ug/L	60	U			60	U		
Carbon Disulfide, SPLP	ug/L	60	U			60	U		
Carbon Tetrachloride, SPLP	ug/L	60	U			60	U		
Chlorobenzene, SPLP	ug/L	60	U			60	U		
Chloroethane, SPLP	ug/L	60	U			60	U		
Chloroform, SPLP	ug/L	60	U			60	U		
Chloromethane, SPLP	ug/L	60	U			60	U		
Cis-1,2-DICHLOROETHYLENE	ug/kg								
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L	60	U			60	U		
Dibromochloromethane, SPLP	ug/L	60	U			60	U		
Methyl Ethyl Ketone, SPLP	ug/L	100	U			100	U		
Methyl Isobutyl Ketone, SPLP	ug/L	100	U			100	U		
Methylene Chloride, SPLP	ug/L	60	U			60	U		
Styrene, SPLP	ug/L	60	U			60	U		
Tetrachloroethylene(Pce), SPLP	ug/L	60	U			60	U		
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L	60	U			60	U		
Trichloroethylene (TCE), SPLP	ug/L	60	U			60	U		
Vinyl Acetate, SPLP	ug/L	60	U			60	U		
Vinyl Chloride, SPLP	ug/L	60	U			60	U		
Benzene	ug/kg								
Chloromethane	ug/kg								
Naphthalene, SPLP	ug/L			5	U			6	U
Naphthalene	ug/kg								
Toluene, SPLP	ug/L	60	U			60	U		
Toluene	ug/kg								
Vinyl Chloride	ug/kg								
Bromomethane	ug/kg								
Ethylbenzene, SPLP	ug/L	60	U			60	U		
Ethylbenzene	ug/kg								
Chloroethane	ug/kg								
1,1-Dichloroethene	ug/kg								
Methylene Chloride	ug/kg								
Xylenes, Total, SPLP	ug/L	60	U			60	U		
Xylenes, Total	ug/kg								
1,1-Dichloroethane	ug/kg								
Chloroform	ug/kg								
1,1,1-Trichloroethane	ug/kg								
Carbon Tetrachloride	ug/kg								
1,2-Dichloroethane	ug/kg								

Soil VOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015T1 (0-1ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/15/1999		10/21/1999		10/15/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
1,1,1-Trichloroethane, SPLP	ug/L								
1,1,2,2-Tetrachloroethane, SPLP	ug/L								
1,1,2-Trichloroethane, SPLP	ug/L								
1,1-Dichloroethane, SPLP	ug/L								
1,1-Dichloroethene, SPLP	ug/L								
1,2-Dichloroethane, SPLP	ug/L								
1,2-Dichloroethene (Total), SPLP	ug/L								
1,2-Dichloropropane, SPLP	ug/L								
2-Chloroethyl Vinyl Ether, SPLP	ug/L								
2-Hexanone, SPLP	ug/L								
Acetone, SPLP	ug/L								
Benzene, SPLP	ug/L								
Bromodichloromethane, SPLP	ug/L								
Bromoform, SPLP	ug/L								
Bromomethane, SPLP	ug/L								
Carbon Disulfide, SPLP	ug/L								
Carbon Tetrachloride, SPLP	ug/L								
Chlorobenzene, SPLP	ug/L								
Chloroethane, SPLP	ug/L								
Chloroform, SPLP	ug/L								
Chloromethane, SPLP	ug/L								
Cis-1,2-DICHLOROETHYLENE	ug/kg								
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L								
Dibromochloromethane, SPLP	ug/L								
Methyl Ethyl Ketone, SPLP	ug/L								
Methyl Isobutyl Ketone, SPLP	ug/L								
Methylene Chloride, SPLP	ug/L								
Styrene, SPLP	ug/L								
Tetrachloroethylene(Pce), SPLP	ug/L								
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L								
Trichloroethylene (TCE), SPLP	ug/L								
Vinyl Acetate, SPLP	ug/L								
Vinyl Chloride, SPLP	ug/L								
Benzene	ug/kg	4	UJ			6	U		
Chloromethane	ug/kg	4	UJ			6	U		
Naphthalene, SPLP	ug/L								
Naphthalene	ug/kg			370	U			510	U
Toluene, SPLP	ug/L								
Toluene	ug/kg	4	UJ			6	U		
Vinyl Chloride	ug/kg	4	UJ			6	U		
Bromomethane	ug/kg	4	UJ			6	U		
Ethylbenzene, SPLP	ug/L								
Ethylbenzene	ug/kg	4	UJ			6	U		
Chloroethane	ug/kg	4	UJ			6	U		
1,1-Dichloroethene	ug/kg	4	UJ			6	U		
Methylene Chloride	ug/kg	8	UJ			6	U		
Xylenes, Total, SPLP	ug/L								
Xylenes, Total	ug/kg	4	UJ			6	U		
1,1-Dichloroethane	ug/kg	4	UJ			6	U		
Chloroform	ug/kg	4	UJ			6	U		
1,1,1-Trichloroethane	ug/kg	4	UJ			6	U		
Carbon Tetrachloride	ug/kg	4	UJ			6	U		
1,2-Dichloroethane	ug/kg	4	UJ			6	U		

Soil VOCs

Parameter	Units	StationID	SampleID	DateCollected	DateAnalyzed	SDGNumber							
		F619SB016	619SB01601 (0-1ft)	10/15/1999	10/29/1999	EN023							
		F619SB016	619SB01602 (3-5ft)	10/15/1999	10/28/1999	EN023							
		F619SB017	619SB01701 (0-1ft)	10/15/1999	10/28/1999	EN023							
		F619SB017	619SB01702 (3-5ft)	10/15/1999	10/29/1999	EN023							
1,1,1-Trichloroethane, SPLP	ug/L												
1,1,2,2-Tetrachloroethane, SPLP	ug/L												
1,1,2-Trichloroethane, SPLP	ug/L												
1,1-Dichloroethane, SPLP	ug/L												
1,1-Dichloroethene, SPLP	ug/L												
1,2-Dichloroethane, SPLP	ug/L												
1,2-Dichloroethene (Total), SPLP	ug/L												
1,2-Dichloropropane, SPLP	ug/L												
2-Chloroethyl Vinyl Ether, SPLP	ug/L												
2-Hexanone, SPLP	ug/L												
Acetone, SPLP	ug/L												
Benzene, SPLP	ug/L												
Bromodichloromethane, SPLP	ug/L												
Bromoform, SPLP	ug/L												
Bromomethane, SPLP	ug/L												
Carbon Disulfide, SPLP	ug/L												
Carbon Tetrachloride, SPLP	ug/L												
Chlorobenzene, SPLP	ug/L												
Chloroethane, SPLP	ug/L												
Chloroform, SPLP	ug/L												
Chloromethane, SPLP	ug/L												
Cis-1,2-DICHLOROETHYLENE	ug/kg												
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L												
Dibromochloromethane, SPLP	ug/L												
Methyl Ethyl Ketone, SPLP	ug/L												
Methyl Isobutyl Ketone, SPLP	ug/L												
Methylene Chloride, SPLP	ug/L												
Styrene, SPLP	ug/L												
Tetrachloroethylene(Pce), SPLP	ug/L												
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L												
Trichloroethylene (TCE), SPLP	ug/L												
Vinyl Acetate, SPLP	ug/L												
Vinyl Chloride, SPLP	ug/L												
Benzene	ug/kg												
Chloromethane	ug/kg												
Naphthalene, SPLP	ug/L												
Naphthalene	ug/kg	410	U	470	U	370	U	410	U				
Toluene, SPLP	ug/L												
Toluene	ug/kg												
Vinyl Chloride	ug/kg												
Bromomethane	ug/kg												
Ethylbenzene, SPLP	ug/L												
Ethylbenzene	ug/kg												
Chloroethane	ug/kg												
1,1-Dichloroethene	ug/kg												
Methylene Chloride	ug/kg												
Xylenes, Total, SPLP	ug/L												
Xylenes, Total	ug/kg												
1,1-Dichloroethane	ug/kg												
Chloroform	ug/kg												
1,1,1-Trichloroethane	ug/kg												
Carbon Tetrachloride	ug/kg												
1,2-Dichloroethane	ug/kg												

Soil VOCs

	StationID	F619SB018		F619SB018		F619SB019		F619SB019	
	SampleID	619SB01801 (0-1ft)		619SB01802 (3-5ft)		619SB01901 (0-1ft)		619SB01902 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999		10/16/1999		10/16/1999	
	DateAnalyzed	10/28/1999		10/28/1999		10/29/1999		10/29/1999	
	SDGNumber	EN023		EN023		EN025		EN025	
Parameter	Units								
1,1,1-Trichloroethane, SPLP	ug/L								
1,1,2,2-Tetrachloroethane, SPLP	ug/L								
1,1,2-Trichloroethane, SPLP	ug/L								
1,1-Dichloroethane, SPLP	ug/L								
1,1-Dichloroethene, SPLP	ug/L								
1,2-Dichloroethane, SPLP	ug/L								
1,2-Dichloroethene (Total), SPLP	ug/L								
1,2-Dichloropropane, SPLP	ug/L								
2-Chloroethyl Vinyl Ether, SPLP	ug/L								
2-Hexanone, SPLP	ug/L								
Acetone, SPLP	ug/L								
Benzene, SPLP	ug/L								
Bromodichloromethane, SPLP	ug/L								
Bromoform, SPLP	ug/L								
Bromomethane, SPLP	ug/L								
Carbon Disulfide, SPLP	ug/L								
Carbon Tetrachloride, SPLP	ug/L								
Chlorobenzene, SPLP	ug/L								
Chloroethane, SPLP	ug/L								
Chloroform, SPLP	ug/L								
Chloromethane, SPLP	ug/L								
Cis-1,2-DICHLOROETHYLENE	ug/kg								
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L								
Dibromochloromethane, SPLP	ug/L								
Methyl Ethyl Ketone, SPLP	ug/L								
Methyl Isobutyl Ketone, SPLP	ug/L								
Methylene Chloride, SPLP	ug/L								
Styrene, SPLP	ug/L								
Tetrachloroethylene(Pce), SPLP	ug/L								
Trans-1,3-DICHLOROPROPENE, SPLP	ug/L								
Trichloroethylene (TCE), SPLP	ug/L								
Vinyl Acetate, SPLP	ug/L								
Vinyl Chloride, SPLP	ug/L								
Benzene	ug/kg								
Chloromethane	ug/kg								
Naphthalene, SPLP	ug/L								
Naphthalene	ug/kg	360	U	400	U	360	U	470	U
Toluene, SPLP	ug/L								
Toluene	ug/kg								
Vinyl Chloride	ug/kg								
Bromomethane	ug/kg								
Ethylbenzene, SPLP	ug/L								
Ethylbenzene	ug/kg								
Chloroethane	ug/kg								
1,1-Dichloroethene	ug/kg								
Methylene Chloride	ug/kg								
Xylenes, Total, SPLP	ug/L								
Xylenes, Total	ug/kg								
1,1-Dichloroethane	ug/kg								
Chloroform	ug/kg								
1,1,1-Trichloroethane	ug/kg								
Carbon Tetrachloride	ug/kg								
1,2-Dichloroethane	ug/kg								

Soil VOCs

	StationID	F619SB020		F619SB020	
	SampleID	619SB02001 (0-1ft)		619SB02002 (3-5ft)	
	DateCollected	10/15/1999		10/15/1999	
	DateAnalyzed	10/28/1999		10/28/1999	
	SDGNumber	EN023		EN023	
Parameter	Units				
1,1,1-Trichloroethane, SPLP	ug/L				
1,1,2,2-Tetrachloroethane, SPLP	ug/L				
1,1,2-Trichloroethane, SPLP	ug/L				
1,1-Dichloroethane, SPLP	ug/L				
1,1-Dichloroethene, SPLP	ug/L				
1,2-Dichloroethane, SPLP	ug/L				
1,2-Dichloroethene (Total), SPLP	ug/L				
1,2-Dichloropropane, SPLP	ug/L				
2-Chloroethyl Vinyl Ether, SPLP	ug/L				
2-Hexanone, SPLP	ug/L				
Acetone, SPLP	ug/L				
Benzene, SPLP	ug/L				
Bromodichloromethane, SPLP	ug/L				
Bromoform, SPLP	ug/L				
Bromomethane, SPLP	ug/L				
Carbon Disulfide, SPLP	ug/L				
Carbon Tetrachloride, SPLP	ug/L				
Chlorobenzene, SPLP	ug/L				
Chloroethane, SPLP	ug/L				
Chloroform, SPLP	ug/L				
Chloromethane, SPLP	ug/L				
Cis-1,2-DICHLOROETHYLENE	ug/kg				
Cis-1,3-DICHLOROPROPENE, SPLP	ug/L				
Dibromochloromethane, SPLP	ug/L				
Methyl Ethyl Ketone, SPLP	ug/L				
Methyl Isobutyl Ketone, SPLP	ug/L				
Methylene Chloride, SPLP	ug/L				
Styrene, SPLP	ug/L				
Tetrachloroethylene(Pce), SPLP	ug/L				
Trans-1,3-DICHLOROPROPENE, SPLF	ug/L				
Trichloroethylene (TCE), SPLP	ug/L				
Vinyl Acetate, SPLP	ug/L				
Vinyl Chloride, SPLP	ug/L				
Benzene	ug/kg				
Chloromethane	ug/kg				
Naphthalene, SPLP	ug/L				
Naphthalene	ug/kg	370	U	400	U
Toluene, SPLP	ug/L				
Toluene	ug/kg				
Vinyl Chloride	ug/kg				
Bromomethane	ug/kg				
Ethylbenzene, SPLP	ug/L				
Ethylbenzene	ug/kg				
Chloroethane	ug/kg				
1,1-Dichloroethene	ug/kg				
Methylene Chloride	ug/kg				
Xylenes, Total, SPLP	ug/L				
Xylenes, Total	ug/kg				
1,1-Dichloroethane	ug/kg				
Chloroform	ug/kg				
1,1,1-Trichloroethane	ug/kg				
Carbon Tetrachloride	ug/kg				
1,2-Dichloroethane	ug/kg				

Charleston Naval Complex
AOC 619, Zone F

Soil VOCs

	StationID	F619SB001	F619SB001	F619SB001	F619SB001
	SampleID	619SB001S1 (0-1ft)	619SB001S1 (0-1ft)	619SB001S2 (3-5ft)	619SB001S2 (3-5ft)
	DateCollected	10/14/1999	10/14/1999	10/14/1999	10/14/1999
	DateAnalyzed	10/19/1999	10/25/1999	10/19/1999	10/22/1999
	SDGNumber	EN020	EN020	EN020	EN020
Parameter	**Units**				
Trichloroethylene (TCE)	ug/kg				
1,2-Dichloropropane	ug/kg				
Bromodichloromethane	ug/kg				
1,1,2-Trichloroethane	ug/kg				
Tetrachloroethylene(PCE)	ug/kg				
Dibromochloromethane	ug/kg				
Chlorobenzene	ug/kg				
Styrene	ug/kg				
Bromoform	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg				
Acetone	ug/kg				
Carbon Disulfide	ug/kg				
Vinyl Acetate	ug/kg				
Methyl Ethyl Ketone (2-Butanone)	ug/kg				
2-Chloroethyl Vinyl Ether	ug/kg				
Methyl Isobutyl Ketone	ug/kg				
Cis-1,3-DICHLOROPROPENE	ug/kg				
Trans-1,3-DICHLOROPROPENE	ug/kg				
2-Hexanone	ug/kg				
1,2-Dichloroethene (Total)	ug/kg				

Soil VOCs

	StationID	F619SB001		F619SB001		F619SB001		F619SB001	
	SampleID	619SB001T1 (0-1ft)		619SB001T1 (0-1ft)		619SB001T2 (3-5ft)		619SB001T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/15/1999		10/21/1999		10/15/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Trichloroethylene (TCE)	ug/kg	4	U			3	U		
1,2-Dichloropropane	ug/kg	4	U			3	U		
Bromodichloromethane	ug/kg	4	U			3	U		
1,1,2-Trichloroethane	ug/kg	4	U			3	UJ		
Tetrachloroethylene(PCE)	ug/kg	4	U			3	UJ		
Dibromochloromethane	ug/kg	4	U			3	UJ		
Chlorobenzene	ug/kg	4	U			3	UJ		
Styrene	ug/kg	4	U			3	UJ		
Bromoform	ug/kg	4	U			3	UJ		
1,1,2,2-Tetrachloroethane	ug/kg	4	U			3	UJ		
Acetone	ug/kg	16	=			29	=		
Carbon Disulfide	ug/kg	4	U			2	J		
Vinyl Acetate	ug/kg	3	U			3	U		
Methyl Ethyl Ketone (2-Butanone)	ug/kg	6	U			5	U		
2-Chloroethyl Vinyl Ether	ug/kg	11	U			10	U		
Methyl Isobutyl Ketone	ug/kg	6	U			5	U		
Cis-1,3-DICHLOROPROPENE	ug/kg	4	U			3	U		
Trans-1,3-DICHLOROPROPENE	ug/kg	4	U			3	UJ		
2-Hexanone	ug/kg	6	U			5	UJ		
1,2-Dichloroethene (Total)	ug/kg	4	U			3	U		

Soil VOCs

	StationID	F619SB004	F619SB004	F619SB004	F619SB004
	SampleID	619SB004S1 (0-1ft)	619SB004S1 (0-1ft)	619SB004S2 (3-5ft)	619SB004S2 (3-5ft)
	DateCollected	10/14/1999	10/14/1999	10/14/1999	10/14/1999
	DateAnalyzed	10/19/1999	10/25/1999	10/19/1999	10/25/1999
	SDGNumber	EN020	EN020	EN020	EN020
Parameter	Units				
Trichloroethylene (TCE)	ug/kg				
1,2-Dichloropropane	ug/kg				
Bromodichloromethane	ug/kg				
1,1,2-Trichloroethane	ug/kg				
Tetrachloroethylene(PCE)	ug/kg				
Dibromochloromethane	ug/kg				
Chlorobenzene	ug/kg				
Styrene	ug/kg				
Bromoform	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg				
Acetone	ug/kg				
Carbon Disulfide	ug/kg				
Vinyl Acetate	ug/kg				
Methyl Ethyl Ketone (2-Butanone)	ug/kg				
2-Chloroethyl Vinyl Ether	ug/kg				
Methyl Isobutyl Ketone	ug/kg				
Cis-1,3-DICHLOROPROPENE	ug/kg				
Trans-1,3-DICHLOROPROPENE	ug/kg				
2-Hexanone	ug/kg				
1,2-Dichloroethene (Total)	ug/kg				

Soil VOCs

	StationID	F619SB004		F619SB004		F619SB004		F619SB004	
	SampleID	619SB004T1 (0-1ft)		619SB004T1 (0-1ft)		619SB004T2 (3-5ft)		619SB004T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/15/1999		10/21/1999		10/15/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Trichloroethylene (TCE)	ug/kg	3	R			5	U		
1,2-Dichloropropane	ug/kg	3	R			5	U		
Bromodichloromethane	ug/kg	3	R			5	U		
1,1,2-Trichloroethane	ug/kg	3	R			5	U		
Tetrachloroethylene(PCE)	ug/kg	3	R			5	U		
Dibromochloromethane	ug/kg	3	R			5	U		
Chlorobenzene	ug/kg	3	R			5	U		
Styrene	ug/kg	3	R			5	U		
Bromoform	ug/kg	3	R			5	U		
1,1,2,2-Tetrachloroethane	ug/kg	3	R			5	UJ		
Acetone	ug/kg	5	R			29	=		
Carbon Disulfide	ug/kg	3	R			4	J		
Vinyl Acetate	ug/kg	3	R			4	U		
Methyl Ethyl Ketone (2-Butanone)	ug/kg	5	R			8	U		
2-Chloroethyl Vinyl Ether	ug/kg	10	R			15	U		
Methyl Isobutyl Ketone	ug/kg	5	R			8	U		
Cis-1,3-DICHLOROPROPENE	ug/kg	3	R			5	U		
Trans-1,3-DICHLOROPROPENE	ug/kg	3	R			5	U		
2-Hexanone	ug/kg	5	R			8	U		
1,2-Dichloroethene (Total)	ug/kg	3	R			5	U		

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Soil VOCs

	StationID	F619SB015	F619SB015	F619SB015	F619SB015
	SampleID	619SB015S1 (0-1ft)	619SB015S1 (0-1ft)	619SB015S2 (3-5ft)	619SB015S2 (3-5ft)
	DateCollected	10/14/1999	10/14/1999	10/14/1999	10/14/1999
	DateAnalyzed	10/19/1999	10/25/1999	10/19/1999	10/26/1999
	SDGNumber	EN020	EN020	EN020	EN020
Parameter	**Units**				
Trichloroethylene (TCE)	ug/kg				
1,2-Dichloropropane	ug/kg				
Bromodichloromethane	ug/kg				
1,1,2-Trichloroethane	ug/kg				
Tetrachloroethylene(PCE)	ug/kg				
Dibromochloromethane	ug/kg				
Chlorobenzene	ug/kg				
Styrene	ug/kg				
Bromoform	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg				
Acetone	ug/kg				
Carbon Disulfide	ug/kg				
Vinyl Acetate	ug/kg				
Methyl Ethyl Ketone (2-Butanone)	ug/kg				
2-Chloroethyl Vinyl Ether	ug/kg				
Methyl Isobutyl Ketone	ug/kg				
Cis-1,3-DICHLOROPROPENE	ug/kg				
Trans-1,3-DICHLOROPROPENE	ug/kg				
2-Hexanone	ug/kg				
1,2-Dichloroethene (Total)	ug/kg				

Soil VOCs

	StationID	F619SB015		F619SB015		F619SB015		F619SB015	
	SampleID	619SB015T1 (0-1ft)		619SB015T1 (0-1ft)		619SB015T2 (3-5ft)		619SB015T2 (3-5ft)	
	DateCollected	10/14/1999		10/14/1999		10/14/1999		10/14/1999	
	DateAnalyzed	10/15/1999		10/21/1999		10/15/1999		10/21/1999	
	SDGNumber	EN020		EN020		EN020		EN020	
Parameter	Units								
Trichloroethylene (TCE)	ug/kg	4	UJ			6	U		
1,2-Dichloropropane	ug/kg	4	UJ			6	U		
Bromodichloromethane	ug/kg	4	UJ			6	U		
1,1,2-Trichloroethane	ug/kg	4	UJ			6	U		
Tetrachloroethylene(PCE)	ug/kg	4	UJ			6	U		
Dibromochloromethane	ug/kg	4	UJ			6	U		
Chlorobenzene	ug/kg	4	UJ			6	U		
Styrene	ug/kg	4	UJ			6	U		
Bromoform	ug/kg	4	UJ			6	U		
1,1,2,2-Tetrachloroethane	ug/kg	4	UJ			6	U		
Acetone	ug/kg	9	J			31	=		
Carbon Disulfide	ug/kg	3	J			6	U		
Vinyl Acetate	ug/kg	4	UJ			6	U		
Methyl Ethyl Ketone (2-Butanone)	ug/kg	6	UJ			10	U		
2-Chloroethyl Vinyl Ether	ug/kg	12	UJ			19	U		
Methyl Isobutyl Ketone	ug/kg	6	UJ			10	U		
Cis-1,3-DICHLOROPROPENE	ug/kg	4	UJ			6	U		
Trans-1,3-DICHLOROPROPENE	ug/kg	4	UJ			6	U		
2-Hexanone	ug/kg	6	UJ			10	U		
1,2-Dichloroethene (Total)	ug/kg	4	UJ			6	U		

Soil VOCs

	StationID	F619SB016	F619SB016	F619SB017	F619SB017
	SampleID	619SB01601 (0-1ft)	619SB01602 (3-5ft)	619SB01701 (0-1ft)	619SB01702 (3-5ft)
	DateCollected	10/15/1999	10/15/1999	10/15/1999	10/15/1999
	DateAnalyzed	10/29/1999	10/28/1999	10/28/1999	10/29/1999
	SDGNumber	EN023	EN023	EN023	EN023
Parameter	**Units**				
Trichloroethylene (TCE)	ug/kg				
1,2-Dichloropropane	ug/kg				
Bromodichloromethane	ug/kg				
1,1,2-Trichloroethane	ug/kg				
Tetrachloroethylene(PCE)	ug/kg				
Dibromochloromethane	ug/kg				
Chlorobenzene	ug/kg				
Styrene	ug/kg				
Bromoform	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg				
Acetone	ug/kg				
Carbon Disulfide	ug/kg				
Vinyl Acetate	ug/kg				
Methyl Ethyl Ketone (2-Butanone)	ug/kg				
2-Chloroethyl Vinyl Ether	ug/kg				
Methyl Isobutyl Ketone	ug/kg				
Cis-1,3-DICHLOROPROPENE	ug/kg				
Trans-1,3-DICHLOROPROPENE	ug/kg				
2-Hexanone	ug/kg				
1,2-Dichloroethene (Total)	ug/kg				

Soil VOCs

	StationID	F619SB018	F619SB018	F619SB019	F619SB019
	SampleID	619SB01801 (0-1ft)	619SB01802 (3-5ft)	619SB01901 (0-1ft)	619SB01902 (3-5ft)
	DateCollected	10/15/1999	10/15/1999	10/16/1999	10/16/1999
	DateAnalyzed	10/28/1999	10/28/1999	10/29/1999	10/29/1999
	SDGNumber	EN023	EN023	EN025	EN025
Parameter	Units				
Trichloroethylene (TCE)	ug/kg				
1,2-Dichloropropane	ug/kg				
Bromodichloromethane	ug/kg				
1,1,2-Trichloroethane	ug/kg				
Tetrachloroethylene(PCE)	ug/kg				
Dibromochloromethane	ug/kg				
Chlorobenzene	ug/kg				
Styrene	ug/kg				
Bromoform	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg				
Acetone	ug/kg				
Carbon Disulfide	ug/kg				
Vinyl Acetate	ug/kg				
Methyl Ethyl Ketone (2-Butanone)	ug/kg				
2-Chloroethyl Vinyl Ether	ug/kg				
Methyl Isobutyl Ketone	ug/kg				
Cis-1,3-DICHLOROPROPENE	ug/kg				
Trans-1,3-DICHLOROPROPENE	ug/kg				
2-Hexanone	ug/kg				
1,2-Dichloroethene (Total)	ug/kg				

Soil VOCs

	StationID	F619SB020	F619SB020
	SampleID	619SB02001 (0-1ft)	619SB02002 (3-5ft)
	DateCollected	10/15/1999	10/15/1999
	DateAnalyzed	10/28/1999	10/28/1999
	SDGNumber	EN023	EN023
Parameter	**Units**		
Trichloroethylene (TCE)	ug/kg		
1,2-Dichloropropane	ug/kg		
Bromodichloromethane	ug/kg		
1,1,2-Trichloroethane	ug/kg		
Tetrachloroethylene(PCE)	ug/kg		
Dibromochloromethane	ug/kg		
Chlorobenzene	ug/kg		
Styrene	ug/kg		
Bromoform	ug/kg		
1,1,2,2-Tetrachloroethane	ug/kg		
Acetone	ug/kg		
Carbon Disulfide	ug/kg		
Vinyl Acetate	ug/kg		
Methyl Ethyl Ketone (2-Butanone)	ug/kg		
2-Chloroethyl Vinyl Ether	ug/kg		
Methyl Isobutyl Ketone	ug/kg		
Cis-1,3-DICHLOROPROPENE	ug/kg		
Trans-1,3-DICHLOROPROPENE	ug/kg		
2-Hexanone	ug/kg		
1,2-Dichloroethene (Total)	ug/kg		

Charleston Naval Complex
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Groundwater Metals

	StationID	F619GW001		F619GW002		F619GW003		F620GW001	
	SampleID	619GW00104		619GW00204		619GW00304		620GW00104	
	DateCollected	12/01/1997		11/25/1997		11/25/1997		11/19/1997	
	DateAnalyzed	12/10/1997		12/10/1997		12/10/1997		12/08/1997	
	SDGNumber	31975		31975		31975		31911	
Parameter	**Units**								
Aluminum	ug/L	31.7	U	323	=	117	=	834	=
Antimony	ug/L	1 6	U	9.4	U	1.6	U	1.9	J
Arsenic	ug/L	7.4	U	6.8	U	4.5	U	6.3	J
Barium	ug/L	10.5	=	18.5	=	64.5	=	317	J
Beryllium	ug/L	0.51	U	0.25	U	0.6	U	0.2	U
Cadmium	ug/L	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	ug/L	19500	=	52600	=	144000	=	95600	=
Chromium, Total	ug/L	1	U	1.9	J	2.3	J	8	J
Cobalt	ug/L	0.8	U	0.8	U	0.85	J	1.1	J
Copper	ug/L	1 4	U	1.4	U	3.2	J	5.3	U
Iron	ug/L	961	=	459	=	5720	=	3710	J
Lead	ug/L	0.9	UJ	0 9	UJ	0.9	UJ	4.1	U
Magnesium	ug/L	3310	=	16700	=	223000	=	213000	=
Manganese	ug/L	14.1	=	90.9	=	934	=	186	=
Mercury	ug/L	0.1	U	0 1	U	0.13	U	0 1	U
Nickel	ug/L	0.7	U	1.4	U	2	U	4.3	J
Potassium	ug/L	2930	=	24000	=	87100	=	25500	=
Selenium	ug/L	3.4	U	3.4	U	3.4	U	3.4	U
Silver	ug/L	1	U	1	U	1	U	1	U
Sodium	ug/L	87300	U	284000	=	2590000	=	611000	=
Thallium	ug/L	5	U	5	U	5	U	5	U
Tin (Sn)	ug/L	4.5	U	4 5	U	4.5	U	14	U
Vanadium	ug/L	1.1	J	14.7	=	5.6	J	18.8	J
Zinc	ug/L	14.5	U	7 5	U	5.8	U	33 2	U

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Groundwater PCBs

	StationID	F619GW001		F619GW002		F619GW003	
	SampleID	619GW00104		619GW00204		619GW00304	
	DateCollected	12/01/1997		11/25/1997		11/25/1997	
	DateAnalyzed	12/11/1997		12/03/1997		12/03/1997	
	SDGNumber	31975		31975		31975	
Parameter	Units						
PCB-1016 (Arochlor 1016)	UG/L	0.5	U	0.5	U	0.5	UJ
PCB-1221 (Arochlor 1221)	UG/L	0.5	U	0.5	U	0.5	UJ
PCB-1232 (Arochlor 1232)	UG/L	0.5	U	0.5	U	0.5	UJ
PCB-1242 (Arochlor 1242)	UG/L	0.5	U	0.5	U	0.5	UJ
PCB-1248 (Arochlor 1248)	UG/L	0.5	U	0.5	U	0.5	UJ
PCB-1254 (Arochlor 1254)	UG/L	1	U	1	U	1	UJ
PCB-1260 (Arochlor 1260)	UG/L	1	U	1	U	1	UJ

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Groundwater Pesticides

	StationID	F619GW001		F619GW002		F619GW003	
	SampleID	619GW00104		619GW00204		619GW00304	
	DateCollected	12/01/1997		11/25/1997		11/25/1997	
	DateAnalyzed	12/11/1997		12/03/1997		12/03/1997	
	SDGNumber	31975		31975		31975	
Parameter	Units						
Alpha BHC	UG/L	0.02	U	0.02	UJ	0.02	UJ
Gamma BHC (Lindane)	UG/L	0.02	U	0 02	UJ	0 02	UJ
Beta BHC	UG/L	0.02	U	0.02	UJ	0.02	UJ
Heptachlor	UG/L	0 02	U	0 02	UJ	0.02	UJ
Delta BHC	UG/L	0.02	U	0.02	UJ	0.02	UJ
Aldrin	UG/L	0.02	U	0.02	UJ	0.02	UJ
Heptachlor Epoxide	UG/L	0 02	U	0.02	UJ	0.02	UJ
Gamma-Chlordane	UG/L	0.02	U	0.02	UJ	0 02	UJ
Alpha-Chlordane	UG/L	0 02	U	0.02	UJ	0.02	UJ
Endosulfan I	UG/L	0.02	U	0.02	UJ	0.02	UJ
P,P'-DDE	UG/L	0.04	U	0.04	UJ	0.04	UJ
Dieldrin	UG/L	0.04	U	0 04	UJ	0.04	UJ
Endrin	UG/L	0.04	U	0.04	UJ	0 04	UJ
P,P'-DDD	UG/L	0.04	U	0.04	UJ	0.04	UJ
Endosulfan II	UG/L	0.04	U	0.04	UJ	0.04	UJ
P,P'-DDT	UG/L	0.04	U	0.04	UJ	0 04	UJ
Endrin Aldehyde	UG/L	0.04	U	0.04	UJ	0.04	UJ
Endosulfan Sulfate	UG/L	0.04	U	0 04	UJ	0 04	UJ
Methoxychlor	UG/L	0.19	U	0.19	UJ	0.19	UJ
Endrin Ketone	UG/L	0 04	U	0 04	UJ	0.04	UJ
Toxaphene	UG/L	1.2	U	1.2	UJ	1.2	UJ

Groundwater SVOCs

	StationID	F619GW001		F619GW002		F619GW003		F620GW001	
	SampleID	619GW00104		619GW00204		619GW00304		620GW00104	
	DateCollected	12/01/1997		11/25/1997		11/25/1997		11/19/1997	
	DateAnalyzed	12/10/1997		12/08/1997		12/09/1997		12/04/1997	
	SDGNumber	31975		31975		31975		31911	
Parameter	Units								
2,2'-Oxybis[1-Chloro)Propane	UG/L	10	U	10	U	10	R	10	U
2-Methylnaphthalene	UG/L	10	U	10	U	10	R	10	U
2-Methylphenol (o-Cresol)	UG/L	10	U	10	U	10	R	10	U
Phenol	UG/L	10	U	10	U	10	R	10	U
Acenaphthylene	UG/L	10	U	10	U	10	R	10	U
Bis(2-Chloroethyl) Ether	UG/L	10	U	10	U	10	R	10	U
2-Chlorophenol	UG/L	10	U	10	U	10	R	10	U
Acenaphthene	UG/L	10	U	10	U	10	R	10	U
1,3-Dichlorobenzene	UG/L	10	U	10	U	10	R	10	U
Fluorene	UG/L	10	U	10	U	10	R	10	U
1,4-Dichlorobenzene	UG/L	10	U	10	U	10	R	10	U
Phenanthrene	UG/L	10	U	10	U	10	R	10	U
Anthracene	UG/L	10	U	10	U	10	R	10	U
Benzyl Alcohol	UG/L	10	U	10	U	10	R	10	U
Fluoranthene	UG/L	10	U	10	U	10	R	10	U
1,2-Dichlorobenzene	UG/L	10	U	10	U	10	R	10	U
Pyrene	UG/L	10	U	10	U	10	R	10	U
Benzo(a)Anthracene	UG/L	10	U	10	U	10	R	10	U
Chrysene	UG/L	10	U	10	U	10	R	10	U
Benzo(b)Fluoranthene	UG/L	10	U	10	U	10	R	10	U
N-Nitrosodi-N-Propylamine	UG/L	10	U	10	U	10	R	10	U
4-Methylphenol (p-Cresol)	UG/L	10	U	10	U	10	R	10	U
Benzo(k)Fluoranthene	UG/L	10	U	10	U	10	R	10	U
Benzo(a)Pyrene	UG/L	10	U	10	U	10	R	10	U
Hexachloroethane	UG/L	10	U	10	U	10	R	10	U
Indeno(1,2,3-c,d)Pyrene	UG/L	10	U	10	U	10	R	10	U
Nitrobenzene	UG/L	10	U	10	U	10	R	10	U
Dibenz(a,h)Anthracene	UG/L	10	U	10	U	10	R	10	U
Isophorone	UG/L	10	U	10	U	10	R	10	U
2-Nitrophenol	UG/L	10	U	10	U	10	R	10	U
Benzo(g,h,i)Perylene	UG/L	10	U	10	U	10	R	10	U
2,4-Dimethylphenol	UG/L	10	U	10	U	10	R	10	U
Bis(2-Chloroethoxy) Methane	UG/L	10	U	10	U	10	R	10	U
Benzoic Acid	UG/L	50	U	50	U	50	R	50	U
2,4-Dichlorophenol	UG/L	10	U	10	U	10	R	10	U
1,2,4-Trichlorobenzene	UG/L	10	U	10	U	10	R	10	U
4-Chloroaniline	UG/L	10	U	10	U	10	R	10	U
Hexachlorobutadiene	UG/L	10	U	10	U	10	R	10	U
4-Chloro-3-Methylphenol	UG/L	10	U	10	U	10	R	10	U
Hexachlorocyclopentadiene	UG/L	10	U	10	U	10	R	10	U
2,4,6-Trichlorophenol	UG/L	10	U	10	U	10	R	10	U
2,4,5-Trichlorophenol	UG/L	50	U	50	U	50	R	50	U
2-Chloronaphthalene	UG/L	10	U	10	U	10	R	10	U
2-Nitroaniline	UG/L	50	U	50	U	50	R	50	U
2,6-Dinitrotoluene	UG/L	10	U	10	U	10	R	10	U
3-Nitroaniline	UG/L	50	U	50	U	50	R	50	U
2,4-Dinitrophenol	UG/L	50	U	50	U	50	R	50	U
Dibenzofuran	UG/L	10	U	10	U	10	R	10	U
4-Nitrophenol	UG/L	50	U	50	U	50	R	50	U
2,4-Dinitrotoluene	UG/L	10	U	10	U	10	R	10	UJ
Dimethyl Phthalate	UG/L	10	U	10	U	10	R	10	U
Diethyl Phthalate	UG/L	10	U	10	U	10	R	10	U
4-Chlorophenyl Phenyl Ether	UG/L	10	U	10	U	10	R	10	U

Groundwater SVOCs

Parameter	Units	StationID	SampleID	DateCollected	DateAnalyzed	SDGNumber	Result	Qual
4-Nitroaniline	UG/L	F619GW001	619GW00104	12/01/1997	12/10/1997	31975	50	U
4,6-Dinitro-2-Methylphenol	UG/L						50	U
N-Nitrosodiphenylamine	UG/L						10	U
4-Bromophenyl Phenyl Ether	UG/L						10	U
Hexachlorobenzene	UG/L						10	U
Pentachlorophenol	UG/L						50	U
Di-N-Butyl Phthalate	UG/L						10	U
Benzyl Butyl Phthalate	UG/L						10	U
3,3'-Dichlorobenzidine	UG/L						20	U
Bis(2-Ethylhexyl) Phthalate	UG/L						10	U
Di-N-Octylphthalate	UG/L						10	U
4-Nitroaniline	UG/L	F619GW002	619GW00204	11/25/1997	12/08/1997	31975	50	U
4,6-Dinitro-2-Methylphenol	UG/L						50	U
N-Nitrosodiphenylamine	UG/L						10	U
4-Bromophenyl Phenyl Ether	UG/L						10	U
Hexachlorobenzene	UG/L						10	U
Pentachlorophenol	UG/L						50	U
Di-N-Butyl Phthalate	UG/L						10	U
Benzyl Butyl Phthalate	UG/L						10	U
3,3'-Dichlorobenzidine	UG/L						20	U
Bis(2-Ethylhexyl) Phthalate	UG/L						10	R
Di-N-Octylphthalate	UG/L						10	U
4-Nitroaniline	UG/L	F619GW003	619GW00304	11/25/1997	12/09/1997	31975	50	R
4,6-Dinitro-2-Methylphenol	UG/L						50	R
N-Nitrosodiphenylamine	UG/L						10	R
4-Bromophenyl Phenyl Ether	UG/L						10	R
Hexachlorobenzene	UG/L						10	R
Pentachlorophenol	UG/L						50	R
Di-N-Butyl Phthalate	UG/L						10	R
Benzyl Butyl Phthalate	UG/L						10	R
3,3'-Dichlorobenzidine	UG/L						20	R
Bis(2-Ethylhexyl) Phthalate	UG/L						10	R
Di-N-Octylphthalate	UG/L						10	R
4-Nitroaniline	UG/L	F620GW001	620GW00104	11/19/1997	12/04/1997	31911	50	U
4,6-Dinitro-2-Methylphenol	UG/L						50	U
N-Nitrosodiphenylamine	UG/L						10	U
4-Bromophenyl Phenyl Ether	UG/L						10	U
Hexachlorobenzene	UG/L						10	U
Pentachlorophenol	UG/L						50	U
Di-N-Butyl Phthalate	UG/L						10	U
Benzyl Butyl Phthalate	UG/L						10	U
3,3'-Dichlorobenzidine	UG/L						20	U
Bis(2-Ethylhexyl) Phthalate	UG/L						10	U
Di-N-Octylphthalate	UG/L						10	U

Charleston Naval Complex
AOC 619, Zone F

VOCs	StationID	F619GW001		F619GW001		F619GW002		F619GW002		F619GW003	
	SampleID	619GW00104		619GW00104		619GW00204		619GW00204		619GW00304	
	eCollected	12/01/1997		12/01/1997		11/25/1997		11/25/1997		11/25/1997	
	DateAnalyzed	12/03/1997		12/10/1997		12/03/1997		12/08/1997		12/03/1997	
	SDGNumber	31975		31975		31975		31975		31975	
Parameter	**Units**										
cis-1,2-Dichloroethylene	ug/L										
Benzene	ug/L	5	U			5	U			5	U
Chloromethane	ug/L	5	U			5	U			5	U
Naphthalene	ug/L			10	U			10	U		
Toluene	ug/L	5	U			5	U			5	U
Vinyl Chloride	ug/L	5	U			5	U			5	U
Bromomethane	ug/L	5	U			5	U			5	U
Ethylbenzene	ug/L	5	U			5	U			5	U
Chloroethane	ug/L	5	U			5	U			5	U
1,1-Dichloroethene	ug/L	5	U			5	U			5	U
Methylene Chloride	ug/L	5	U			5	U			5	U
Xylenes, Total	ug/L	5	U			5	U			5	U
1,1-Dichloroethane	ug/L	5	U			5	U			5	U
Chloroform	ug/L	5	U			5	U			5	U
1,1,1-Trichloroethane	ug/L	5	U			5	U			5	U
Carbon Tetrachloride	ug/L	5	U			5	U			5	U
1,2-Dichloroethane	ug/L	5	U			5	U			5	U
Trichloroethylene (TCE)	ug/L	5	U			5	U			5	U
1,2-Dichloropropane	ug/L	5	U			5	U			5	U
Bromodichloromethane	ug/L	5	U			5	U			5	U
1,1,2-Trichloroethane	ug/L	5	U			5	U			5	U
Tetrachloroethylene(PCE)	ug/L	5	U			5	U			5	U
Dibromochloromethane	ug/L	5	U			5	U			5	U
Chlorobenzene	ug/L	5	U			5	U			5	U
Styrene	ug/L	5	U			5	U			5	U
Bromoform	ug/L	5	U			5	U			5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U			5	U			5	U
Acetone	ug/L	5	U			5	U			5	U
Carbon Disulfide	ug/L	5	U			5	U			5	U
Vinyl Acetate	ug/L	5	U			5	U			5	U
Methyl Ethyl Ketone	ug/L	5	U			5	U			5	U
2-Chloroethyl Vinyl Ether	ug/L	5	U			5	U			5	U
Methyl Isobutyl Ketone	ug/L	5	U			5	U			5	U
cis-1,3-Dichloropropene	ug/L	5	U			5	U			5	U
trans-1,3-Dichloropropene	ug/L	5	U			5	U			5	U
2-Hexanone	ug/L	5	U			5	U			5	U
1,2-Dichloroethene (Total)	ug/L	5	U			5	U			5	U

Charleston Naval Complex
AOC 619, Zone F

VOCs	StationID	F619GW003		F620GW001		F620GW001	
	SampleID	619GW00304		620GW00104		620GW00104	
	eCollected	11/25/1997		11/19/1997		11/19/1997	
	DateAnalyzed	12/09/1997		11/25/1997		12/04/1997	
	SDGNumber	31975		31911		31911	
Parameter	Units						
cis-1,2-Dichloroethylene	ug/L						
Benzene	ug/L			5	U		
Chloromethane	ug/L			5	U		
Naphthalene	ug/L	10	R			10	U
Toluene	ug/L			5	U		
Vinyl Chloride	ug/L			5	U		
Bromomethane	ug/L			5	UJ		
Ethylbenzene	ug/L			1	J		
Chloroethane	ug/L			5	UJ		
1,1-Dichloroethene	ug/L			5	U		
Methylene Chloride	ug/L			6	U		
Xylenes, Total	ug/L			7	=		
1,1-Dichloroethane	ug/L			5	U		
Chloroform	ug/L			5	U		
1,1,1-Trichloroethane	ug/L			5	U		
Carbon Tetrachloride	ug/L			5	U		
1,2-Dichloroethane	ug/L			5	U		
Trichloroethylene (TCE)	ug/L			5	U		
1,2-Dichloropropane	ug/L			5	U		
Bromodichloromethane	ug/L			5	U		
1,1,2-Trichloroethane	ug/L			5	U		
Tetrachloroethylene(PCE)	ug/L			5	U		
Dibromochloromethane	ug/L			5	U		
Chlorobenzene	ug/L			5	U		
Styrene	ug/L			5	U		
Bromoform	ug/L			5	U		
1,1,2,2-Tetrachloroethane	ug/L			5	U		
Acetone	ug/L			8	U		
Carbon Disulfide	ug/L			5	U		
Vinyl Acetate	ug/L			5	U		
Methyl Ethyl Ketone	ug/L			5	U		
2-Chloroethyl Vinyl Ether	ug/L			5	U		
Methyl Isobutyl Ketone	ug/L			5	U		
cis-1,3-Dichloropropene	ug/L			5	U		
trans-1,3-Dichloropropene	ug/L			5	U		
2-Hexanone	ug/L			5	U		
1,2-Dichloroethene (Total)	ug/L			5	U		

APPENDIX C

Validation Reports for Additional Sampling Data

The material for Appendix C is provided in .pdf format on the CD-ROM that is inserted in this binder.

APPENDIX D

Summary of SSL Derivation Methodology

Appendix D

Soil Screening Level Tables

Soil Screening Levels (SSLs) were prepared as described in the attached *Technical Memorandum: Application of Soil-Screening Levels (SSLs) at Charleston Naval Complex (CNC)*, dated January 9, 2001. Infiltration rates were subsequently adjusted to account for the full infiltration value provided by the U.S. Geological Survey (USGS). The SSL tables provided in this appendix present values for dilution attenuation factor (DAF) and corresponding SSLs, both of which were calculated using the partial infiltration and the full infiltration rates.

Application of Soil-Screening Levels (SSLs) at Charleston Naval Complex (CNC)

PREPARED FOR: CNC BCT

PREPARED BY: Paul Favara

DATE: January 9, 2001

Introduction

The purpose of this memorandum is to present the rationale CH2M-Jones will use in developing Soil Screening Levels (SSLs) that are protective of groundwater. The development of SSLs is a process that considers data from a multitude of sources, ranging from laboratory results to literature referenced values. As data availability, and quantity, for different SWMUs /AOCs is variable, and data input sources to the SSL calculation can be from a wide variety of sources, it is not possible to develop a process that will precisely identify SSL development for every possible data availability scenario. However, this memorandum presents an overall approach to developing SSLs that should apply to the majority of sites at CNC.

Site-Specific SSLs for groundwater protection are derived using the methods presented in the OSWER Soil Screening Guidance, July 1996 (EPA, 1996). The guidance document requires development of two independent equations to deriving site-specific SSLs:

Step 1: The first step involves solving a partitioning calculation, to derive target soil concentrations independent of aquifer characteristics.

Step 2: The second step further revises the target concentration based on the dilution attenuation factor (DAF) of the aquifer.

Throughout this memorandum, SWMUs/AOCs in Zone F will be used as an example.

Step 1: Partitioning Calculations

Contaminants at CNC can be subdivided into two broad contaminant groups: organics and metals. Each group will follow a separate flow chart for the development of partitioning equation (See Figures 1 and 2).

Organics

A flow chart for developing a partition coefficient for organic compounds is presented in Figure 1. For organic compounds, the partitioning equation (Eqn 10 in the EPA, 1996) is

used to calculate a soil concentration protective of groundwater. The target soil concentration is a function of the target leachate concentration, and soil characteristics such as porosity, density, and fraction of organic carbon. The partitioning equation provides a target soil concentration assuming no dilution or attenuation within the aquifer (i.e., dilution-attenuation factor (DAF) = 1).

Equation 10: $SSL_{DAF=1} = C_W \left[K_d + \frac{(\theta_w + \theta_a H')}{\gamma_{dry}}\right]$

where SSL = Target soil screening level (with a DAF of 1)
C_W = target leachate concentration (MCL or other appropriate standard)
K_d = soil water partition coefficient (chemical specific), = $K_{oc} \times f_{oc}$
θ_w = water-filled soil porosity
θ_a = air-filled soil porosity
H′ = Henry's Law constant (chemical-specific)
γ_{dry} = soil dry bulk density

At Zone F, soil parameters were measured at each site and the geometric mean was used when more than one sample was collected. Sites within Zone F were organized into seven site groupings according to proximity. The geometric mean of the fraction of soil that is organic carbon (also referred to as f_{oc}) for each site grouping was calculated and used as the central tendency f_{oc} value to allow for the probability that f_{oc} in soil is lognormally distributed. The table below presents f_{oc} data.

With respect to soil parameters (bulk density and water- and air-filled porosity) a zone-wide average was considered most representative of site conditions to account for variability of laboratory tests and the statistically low number of Shelby tube samples collected for this analysis.

Fraction of Organic Carbon at Zone F Site Groups

	f_{oc} in All Soil Samples[1]			f_{oc} in Surface Soil Samples[2]		
Site Group	Number of Samples	Arithmetic Mean	Geometric Mean	Number of Samples	Arithmetic Mean	Geometric Mean
004/619 036/620	10	0.022	0.011	4	0.043	0.030
109	6	0.013	0.010	3	0.0095	0.0086
607	9	0.006	0.0051	3	0.0061	0.0056
609, 611	11	0.034	0.0065	5	0.069	0.016
613/615/ 175	7	0.013	0.007	3	0.0075	0.0067
616, 617	7	0.0049	0.0042	3	0.0028	0.0025
709	2	0.0205	0.0204	1	0.019	0.019

Notes:

[1] = Use geometric mean of all site soil samples to calculate soil-to-groundwater SSLs.

[2] = Use geometric mean of site surface soil samples to calculate soil-to-air SSLs.

Equation 10 was used at Zone F to derive the partitioning component SSLs development for organic compounds.

Inorganics

A flow chart for developing a partition coefficient for inorganic constituents is presented in Figure 2. As provided for in EPA (1996), leach tests were used to develop SSLs for soil inorganics. SPLP tests were conducted on new samples from the AOCs and SWMUs and the leachate was compared to the related concentrations in the bulk samples. The methodology used to estimate contaminant release in soil leachate is based on the Freundlich equation, which was developed to model sorption from liquids to solids. The based Freundlich equation applied to the soil/water system is:

$$K_d = C_s / C_w^{\,n}$$

Where:

K_d = Freundlich soil/water partition coefficient (L/kg)

C_s = concentration sorbed on soil (mg/kg)

C_w = solution concentration (mg/L)

n = Freundlich exponent (dimensionless)

Assuming that adsorption is linear with respect to concentration, the equation can be re-arranged to backcalculate a sorbed concentration (C_s):

$$C_s = (K_d)C_w$$

For the SSL calculation, C_w is the target soil leachate concentration.

To develop the K_d, soil was sampled from 2 to 4 locations at each AOC (except AOC 709) and analyzed for total organic carbon, VOCs, SVOCs, metals, cyanide, pesticides, and PCBs, and for SPLP on the above analyte list. Surface soil and subsurface soil samples were collected from each location. In general, PCBs, pesticides, and organic compounds were not detected in the leachate. Therefore, the K_d was used to calculate SSLs for inorganics, and the partitioning equation was used to calculate SSLs for organics and those inorganics with insufficient SPLP data. However, there were some instances where the inorganic analyte was not detected; methods to address these occurrences are listed below.

Situation	Resolution
Parameter detected in bulk, but nondetect in the leach	Use one-half the detection limit for leach samples as the leach value
Parameter detected in the leach but nondetect in the bulk	Use the detection limit for bulk samples as the bulk value
Parameter non-detect in both the bulk and the leach	No value assigned
Re-extraction analyses	Either use the re-extraction result or, if the origina analysis uses lower detection limits, assign the original value to the bulk and/or leach

K_d was calculated for detected parameters in each sample and averaged geometrically to assign a central-tendency K_d value to each inorganic parameter at each site group. This central-tendency K_d was then used to calculate the parameter's target SSL (DAF = 1), using the equation shown above. Because sample sizes were small and the underlying K_d distributions were assumed to be lognormal, geometric means were used.

A zone-specific SSL was used when certain inorganics were not detected in both bulk and leach portions of any of the SPLP samples from a given site group. Zone-specific SSLs were developed by obtaining the geometric means of SSLs from all Zone F site groups with relevant data.

If an SSL was not available via SPLP in the rest of the zone, a modified version of equation 10 can be used:

Equation 10b: $$SSL_{DAF=1} = C_W \left[K_d + \frac{(\theta_w)}{\gamma_{dry}}\right]$$

where SSL = Target soil screening level
C_W = target leachate concentration (MCL or RBC if MCL not available)
K_d = soil water partition coefficient (chemical specific),
θ_w = water-filled soil porosity
γ_{dry} = soil dry bulk density

Step 2: Dilution-Attenuation Factors

Dilution-attenuation factors (DAF) were calculated for each site within Zone F to account for the dilution effect of the aquifer on the soil leachate (either the hypothetical leachate calculated from the partitioning equation or the actual leachate observed in the SPLP.) The DAF is calculated using Equation 11 from the Soil Screening Guidance:

Equation 11: $DAF = 1 + \frac{Kid}{IL}$

Where K = hydraulic conductivity
i = hydraulic gradient
d = mixing zone thickness (from equation 12)
I = infiltration rate
L = source length parallel to groundwater flow direction

The gradient, source length, and mixing zone thickness are specific to each AOC.

The hydraulic conductivity was averaged from the various slug tests conducted within the Zone. A zone-wide average was considered most representative of site conditions to account for differences in well construction, test procedures, and the statistically low number of slug tests per site. Slug test results are presented below.

Zone F Hydraulic Conductivity		
Wells	Hydraulic Conductivity (ft/day) Falling Head	Rising Head
Shallow		
GDF001	6	8.4
607001	1.74	2
607002	0.42	0.62
607004	0.191	0.197
613001	0.83	1.3
613004	0.38	0.27
619002	0.11	0.11
619003	0.28	0.32
620002	0.42	0.41
GEL005	0.42	0.41
GEL007	0.31	0.21
SME004	8.70E-02	9.20E-02
Intermediate		
60701I	1.3	1.2
60702I	0.37	0.55
60704I	0.7	0.66
Deep		
GDF01D	2.7	1.7
60701D	2.70E-02	NM
60702D	2.30E-02	NM
60704D	8.10E-03	NM
61302D	0.12	0.12
Average =	0.82	1.09
	Average for all values =	0.95
NM Not measured		
0.95 ft/day =		346.75 ft/yr
		105.7 m/yr

The USGS estimated infiltration at CNC as 1.2 inch/year (in/yr) (USGS, 1999). However, Zone F is semi-industrial with a large percentage of overall area covered with an impervious surface, and numerous engineered drainage systems to divert runoff and potential recharge. A conservative estimate of 25% of the USGS value was used for Zone F, or 0.3 in/yr (.00762 m/yr), which is considered more realistic for the Zone F sites.

The mixing zone thickness is that portion of the aquifer thickness that may be assumed to transport the contamination. It is estimated from Equation 12 in the Soil Screening Guidance, and does not exceed the total aquifer thickness.

Equation 12: $d = (0.0112L^2)^{0.5} + d_a\{1-\exp[(-LI)/(Kid_a)]\}$

Where d = mixing zone depth (m)
L = source length parallel to groundwater flow direction (m)
d_a = aquifer thickness (m)
I = infiltration rate (m/yr)
K = hydraulic conductivity (m/yr)
i = hydraulic gradient

The following table presents the parameters used to calculate the DAFs for each area within Zone F:

Site(s)	Hydraulic Conductivity K (m/yr)	Hydraulic Gradient i (m/m)	Aquifer Thickness da (m)	Source Length L (m)	Infiltration Rate I (m/yr)	Mixing Zone D (m)	DAF
004/619, 036/620	105.7	0.02	9.8	120	0.00762	9.8	23.7
616,617	105.7	0.018	9.8	34	0.00762	3.7	28.4
607	105.7	0.0079	8.2	46	0.00762	5.3	13.6
609, 611	105.7	0.0043	8.5	38	0.00762	4.6	8.3
109	105.7	0.0058	7.6	30	0.00762	3.5	10.5
613/615/175	105.7	0.0227	9.1	150	0.00762	9.1	20.1
709	105.7	0.025	10.8	120	0.00762	10.8	32.2

The site-specific DAF is influenced by the source length, which may be interpreted to be the length of the spill area, if known, or the dimensions of the AOC, if no specific release area has been identified. It is very conservative to assume the entire AOC dimensions, and this parameter should be refined if possible. Actual DAFs may be assumed to be significantly higher than those presented in the table.

Site-Specific SSLs

When a partitioning coefficient is developed, the site-specific DAF is multiplied by the $SSL_{DAF=1}$ to arrive at the site-specific SSL:

$$SSL = [SSL_{DAF=1}][DAF]$$

When SPLP data is used in lieu of the partitioning equation, the K_d equation can be used to derive a target SSL by making C(leach) equivalent to the maximum acceptable groundwater concentration in the aquifer, and then calculating the corresponding C_s (when $C_s = (K_d)$ And C_w is set to the MCL. This value can then be multiplied by the DAF to define a site specific SSL:

$$SSL = [C_s][DAF]$$

According to the EPA (1996), the average site soil concentration should be compared to the final SSL to evaluate if soil concentrations could potentially impact groundwater. Mapping areas in which maximum soil concentrations exceed SSLs may further reduce the source length L, which has the effect of increasing SSLs. Groundwater concentrations at the site should then be reviewed to evaluate if the soil may be a source of groundwater contamination.

Sensitivity Analysis

SSLs are most sensitive to changes in the dilution-attenuation factor. Thick aquifers show no source size effect because the increases in infiltration flux from a larger source area is balanced by a proportional increase in mixing zone depth, which increases dilution in the aquifer. For relatively thin aquifers, as is generally the case at CNC, the mixing zone depth is limited by the aquifer thickness and the increased infiltration flux predominates, decreasing the dilution factor for a larger source. Therefore, a conservative over-estimate of SWMU/AOC size will result in a lower than necessary DAF being applied to the site.

Attachment A is a detailed sensitivity analysis from the EPA (1996) and discusses sensitivity of other SSL parameters.

References

1. EPA, 1996. Soil Screening Guidance: Technical Background Document (EPA/540/R-95/128, May , 1996).

2. USGS, 1999. Hydrogeology and Simulation of Ground-Water Flow in the Surficial Aquifer System in the Area of Charleston Naval Base, North Charleston, South Carolina, 1995-1997.

Figure 1

Partitioning Calculations
Organics

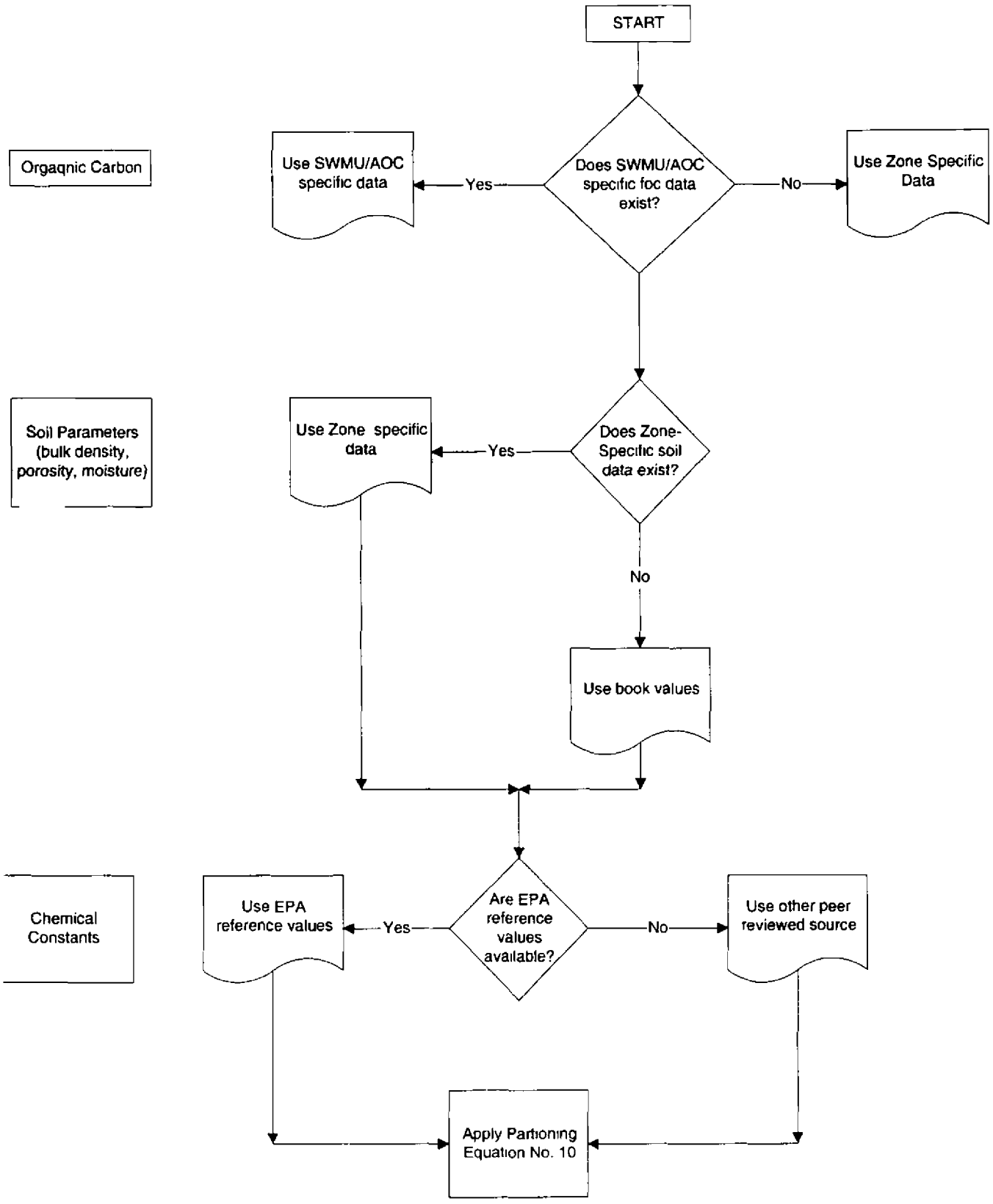
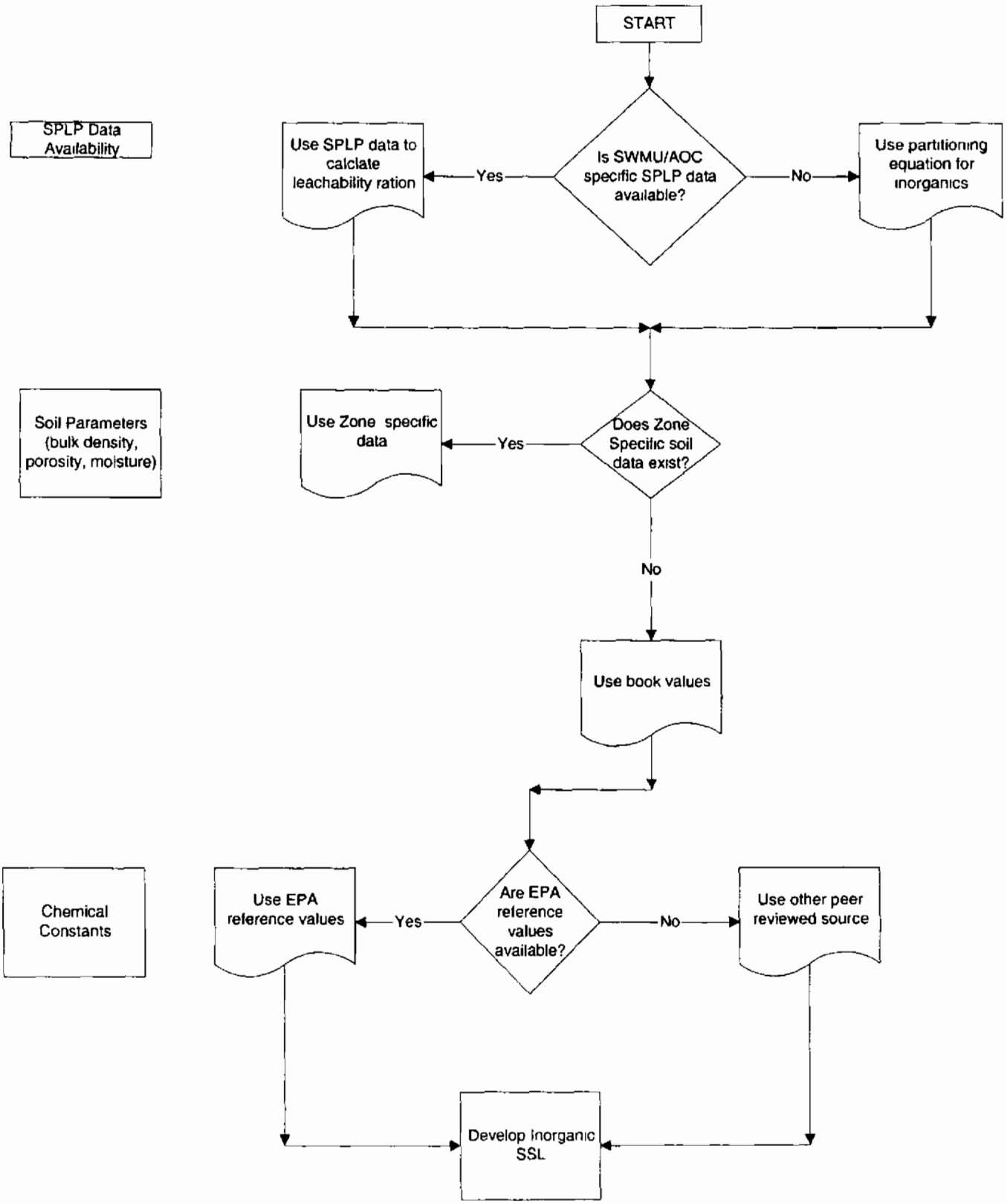


Figure 2

Partitioning Calculations
Inorganics



Attachment A

Excerpts from EPA Soil Screening Guidance (EPA, 1996)

result from a smaller source.

2.5.7 Sensitivity Analysis. A sensitivity analysis was conducted to examine the effects of site-specific parameters on migration to ground water SSLs. Both the partition equation and the dilution factor model were considered in this analysis Because an adequate database of national distributions of these parameters was not available, a nominal range method was used to conduct the analysis. In this analysis, independent parameters were selected and each was taken to maximum and minimum values while keeping all other parameters at their nominal, or default, values.

Overall. SSLs are most sensitive to changes in the dilution factor. As shown in Table 7, the 10th to 90th percentile dilution factors vary from 2 to 292 for the 300 DNAPL and HGDB sites. Much of this variability can be attributed to the wide range of aquifer hydraulic conductivity across the Nation. In contrast, the most sensitive parameter in the partition equation (f_{oc}) only affects the SSL by a factor of 1.5.

Partition Equation. The partition equation requires the following site-specific inputs: fraction organic carbon, average annual soil moisture content, and soil bulk density. Although volumetric soil moisture content is somewhat dependent on bulk density (in terms of the porosity available to be filled with water), calculations were conducted to ensure that the parameter ranges selected do not result in impossible combinations of these parameters. Because the effects of the soil parameters on the SSLs are highly dependent on chemical properties, the analysis was conducted on four organic chemicals spanning the range of these properties: chloroform, trichloroethylene, naphthalene, and benzo(*a*)pyrene.

The range used for soil moisture conditions was 0.02 to 0.43 L water/L soil. The lower end of this range represents a likely residual moisture content value for sand, as might be found in the drier regions of the United States. The higher value (0.43) represents full saturation conditions for a loam soil. The range of bulk density (1.25 to 1.75) was obtained from the Patriot soils database, which contains bulk density measurements for over 20,000 soil series across the United States.

Establishing a range for subsurface organic carbon content (f_{oc}) was more difficult. In spite of an extensive literature review and contacts with soil scientists, very little information was found on the distribution of this parameter with depth in U.S. soils. The range used was 0.001 to 0.003 g carbon / g soil. The lower limit represents the critical organic carbon content below which the partition equation is no longer applicable. The upper limit was obtained from EPA's Environmental Research Laboratory in Ada, Oklahoma, as an expert opinion. Generally, soil organic carbon content falls off rapidly with depth. Since the typical value used as an SSL default for surface soils is 0.006, and 0.002 is used for subsurface soils, this limited range is consistent with the other default assumptions used in the Soil Screening Guidance.

The results of the partition equation sensitivity analysis are shown in Table 8.

For volatile chemicals, the model is somewhat sensitive to water content, with up to 54 and 19 percent change in SSLs for chloroform and trichloroethylene, respectively. The model is less sensitive to bulk density, with a high percent change of 18 for chloroform and 14 for trichloroethylene. Organic carbon content has the greatest effect on SSLs for all chemicals except chloroform. As expected, the effect of f_{oc} increases with increasing K_{oc}. The greatest effect was seen for benzo(*a*)pyrene whose SSL showed a 50 percent increase at an f_{oc} of 0.03. An f_{oc} of 0.005 will increase the benzo(*a*)pyrene SSL by 150 percent.

Dilution Factor. Site-specific parameters for the dilution factor model include aquifer hydraulic conductivity (K), hydraulic gradient (i), infiltration rate (I), aquifer thickness (d), and source length parallel to ground water flow (L). Because they are somewhat dependent, hydraulic conductivity and hydraulic gradient were treated together as Darcy velocity (K × i). The parameter ranges used for the dilution factor analysis represent the 10th and 90th percentile values taken from the HGDB and DNAPL site databases, with the geometric mean serving as the nominal value, as shown in Table 9.

Source length was varied by assuming square sources of 0.5 to 30 acres in size. Bounding estimates were conducted for each of these source sizes.

The results in Table 9 show that Darcy velocity has the greatest effect on the dilution factor, with a range of dilution factors from 1.2 to 85 for a 30-acre source and 2.1 to 263 for a 0.5-acre source. Infiltration rate has the next highest effect, followed by source size and aquifer thickness. Note that aquifer thickness has a profound effect on the influence of source size on the dilution factor. Thick aquifers show no source size effect because the increase in infiltration flux from a larger source is balanced by the increase in mixing zone depth, which increases dilution in the aquifer. For very thin aquifers, the mixing zone depth is limited by the aquifer thickness and the increased infiltration flux predominates, decreasing the dilution factor for larger sources.

Table 7. SSL Dilution Factor Model Results: DNAPL and HGDB Sites

	Source area (acres)				
	0.5	10	30	100	600
DNAPL Sites (92)					
Geomean	34	15	10	6	4
Average	321	138	80	44	19
10th percentile	3	2	1	1	1
25th percentile	8	4	3	2	1
Median	30	13	8	5	3
75th percentile	140	60	35	20	9
90th percentile	336	144	84	46	20
HGDB sites (208)					
Geomean	16	10	7	5	3
Average	958	829	561	371	159
10th percentile	2	1	1	1	1
25th percentile	3	2	1	1	1
Median	10	6	5	3	2
75th percentile	56	30	19	12	5
90th percentile	240	134	90	51	21
All 300 sites					
Geomean	20	11	8	6	3
Average	763	617	414	271	116
10th percentile	2	1	1	1	1
25th percentile	4	2	2	1	1
Median	15	8	5	4	2
75th percentile	70	35	23	13	6
90th percentile	292	144	88	49	21

DAF Values

DNAPL = DNAPL Site Survey (EPA/OERR).
HGDB = Hydrogeologic database (API).

Table 8. Sensitivity Analysis for SSL Partition Equation

Parameter assignments	Chloroform		Trichloroethylene		Naphthalene		Benzo(*a*)pyrene	
	SSL (mg/kg)	Percent change	SSL (mg/kg)	Percent change	SSL (mg/kg)	Percent change	SSL (mg/kg)	Percent change
All default parameter values	0.59	—	0.057	—	84	—	8	—
Less conservative parameter value								
Organic carbon	0.67	14	0.074	29	124	48	12	50
Bulk density	0.69	18	0.065	14	85	1	8	0
Soil moisture	0.74	26	0.062	9	86	2	8	0
More conservative parameter value								
Organic carbon	0.51	-14	0.040	-29	44	-48	4	-50
Bulk density	0.51	-13	0.051	-10	83	-1	8	0
Soil moisture	0.27	-54	0.046	-19	80	-4	8	0

Input parameters	Conservatism		
	Less	Nominal	More
Fraction org. carbon (g/g)	0.003	0.002	0.001
Bulk density (kg/L)	1.25[a]	1.50	1.75[b]
Average soil moisture (L/L)	0.43	0.30	0.02

[a] $n = 0.53$; $q_a = 0.23$.

[b] $n = 0.34$; $q_a = 0.04$.

Chemical-specific parameters	Chloroform	Trichloroethylene	Naphthalene	Benzo(*a*)pyrene
K_{oc}	3.98E+01	1.66E+02	2.00E+03	1.02E+06
H'	1.50E-01	4.22E-01	1.98E-02	4.63E-05
C_w	2.0[c]	0.1[c]	20[d]	0.004[c]

[c] MCL × 20 DAF.

[illegible] × 20 DAF

Table A. DAF Calculations
Assuming100% of USGS Infiltration Rate for all sites; uniform K from all Zone F slug tests

Site(s)	Hydraulic Conductivity K (m/yr)	Hydraulic Gradient I (m/m)	Aquifer Thickness da (m)	Source Length Sw (m)	Infiltration Rate I' (m/yr)	Mixing Zone d (m)	DAF
004/619, 036/620	105.7	0.02	9.8	120	0.0305	9.8	6.7
616,617	105.7	0.018	9.8	21	0.0305	2.6	8.6
607	105.7	0.0079	8.2	46	0.0305	6.4	4.8
609, 611	105.7	0.0043	8.5	38	0.0305	6.2	3.4
109	105.7	0.0058	7.6	30	0.0305	4.5	4.0
613/615/175	105.7	0.0227	9.1	150	0.0305	9.1	5.8
709	105.7	0.025	10.8	120	0.0305	10.8	8.8

From Eqs 11 and 12 in EPA Soil Screening Guidance
Equation assumes that the same soil concentration occurs all the way to the water table. Depth to water has very minor effect on the DAF; only affecting the mixing zone thickness to a limit.

The 'Source width' is almost directly proportional to DAF, as is K and I.

K values are higher if using USGS model instead of all site slug tests

Table B. DAF Calculations
Assuming100% of USGS Infiltration Rate for all sites; K from USGS model

Site(s)	Hydraulic Conductivity K (m/yr)	Hydraulic Gradient I (m/m)	Aquifer Thickness da (m)	Source Length Sw (m)	Infiltration Rate I' (m/yr)	Mixing Zone d (m)	DAF
004/619, 036/620	445	0.02	9.8	120	0.0305	9.8	24.8
616,617	278	0.018	9.8	21	0.0305	2.3	19.4
607	534	0.0079	8.2	46	0.0305	5.2	16.6
609, 611	445	0.0043	8.5	38	0.0305	4.6	8.6
109	300	0.0058	7.6	30	0.0305	3.7	8.0
613/615/175	222	0.0227	9.1	150	0.0305	9.1	11.0
709	278	0.025	10.8	120	0.0305	10.8	21.5

AOC 619/SWMU 4 & AOC620/SWMU36 **ZONE F SSL calculations**

Infiltration, m/yr			I' = .00762	I' = .0305	I' = .0305				
Hydraulic Conductivity, m/yr			105.7	105.7	445				
Site-Specific DAF			23.7	6.7	24.8	Residential	Industrial	Surface	Subsurface
Constituent		SSL for DAF=1	Adjusted SSL	Adjusted SSL	Adjusted SSL	RBC	RBC	Background	Background
Ag	MG/KG	5.8E+01	1377	389	1441	39	1000	1.85	
Al	MG/KG	1.5E+05	3522973	995946	3686486	7800	200000	18500	17100
As	MG/KG	8.1E+01	1922	543	2011	0.43	3.8	19.9	18.2
Ba	MG/KG	1.5E+02	3523	996	3686	550	14000	61.5	51.8
Be	MG/KG	1.8E+00	42	12	44	16	410	1.05	1.2
Ca	MG/KG	0.0E+00							
Cd	MG/KG	4.6E+00	109	31	114	7.8	100	0.26	0.09
Co	MG/KG	1.3E+04	304257	86014	318378	470	12000	15.1	6.85
Cr	MG/KG	3.4E+02	8007	2264	8378	210	450	34.8	32.2
Cu	MG/KG	4.3E+03	102486	28973	107243	310	8200	48.2	30.4
Fe	MG/KG	5.1E+04	1217027	344054	1273514	2300	61000		
Hg	MG/KG	1.6E+00	38	11	40	2.3	61	0.62	0.23
K	MG/KG	0.0E+00							
Mg	MG/KG	0.0E+00							
Mn	MG/KG	1.8E+04	416351	117703	435676	1100	4100	307	469
Na	MG/KG	0.0E+00							
Ni	MG/KG	2.2E+02	5124	1449	5362	160	4100	12.6	8.85
Pb	MG/KG	5.4E+01	1281	400	1341	400	100	180	51.7
Sb	MG/KG	8.8E-01	21	6	22	3.1	82	0.79	
Se	MG/KG	6.8E-01	16	5	17	39	1022	1.15	1.24
Sn	MG/KG	0.0E+00						9.38	
Tl[a]	MG/KG	1.8E-01	4	1	4	0.55	14		1.24
V	MG/KG	5.0E+02	11850	3350	12400	55	1400	48.9	49.4
Zn	MG/KG	1.1E+03	26582	7515	27816	2300	61000	198	84.2

SSL calculated from SPLP data for each site

[a] Thallium from EPA Region III tables; no SPLP detects

Appendix D
SPLP data - AOC 619

Location **619SB001**

Sample No.		Concentration	Units	Qualifier	Sample No.		SPLP Concentration	Units	Qualifier
619SB001T1	Ag	0.05	MG/KG	U	619SB001S1	Ag	1	UG/L	J
0' - 1' depth	Al	9100	MG/KG	=	0' - 1' depth	Al	7760	UG/L	=
	As	9.6	MG/KG	J		As	6.5	UG/L	J
	Ba	33.4	MG/KG	=		Ba	765	UG/L	=
	Be	0.36	MG/KG	J		Be	0.9	UG/L	U
	Ca	5010	MG/KG	J		Ca	10800	UG/L	=
	Cd	0.03	MG/KG	UJ		Cd	0.3	UG/L	UJ
	Co	3.5	MG/KG	J		Co	0.7	UG/L	J
	Cr	17.2	MG/KG	J		Cr	13.3	UG/L	J
	Cu	21.6	MG/KG	=		Cu	6.8	UG/L	J
	Fe	11900	MG/KG	=		Fe	7420	UG/L	J
	Hg	0.16	MG/KG	=		Hg	0.4	UG/L	U
	K	731	MG/KG	J		K	2220	UG/L	J
	Mg	1230	MG/KG	J		Mg	2710	UG/L	J
	Mn	167	MG/KG	=		Mn	19.5	UG/L	=
	Na	353	MG/KG	J		Na	11400	UG/L	=
	Ni	9.2	MG/KG	=		Ni	5.5	UG/L	J
	Pb	58.3	MG/KG	=		Pb	17.7	UG/L	=
	Sb	0.55	MG/KG	J		Sb	3.4	UG/L	J
	Se	1.3	MG/KG	=		Se	2.5	UG/L	J
	Sn	6	MG/KG	J		Sn	3.7	UG/L	J
	Tl	0.25	MG/KG	R		Tl	2.4	UG/L	U
	V	22.4	MG/KG	=		V	19.9	UG/L	J
	Zn	82.9	MG/KG	J		Zn	129	UG/L	J
619SB001T2	Ag	0.04	MG/KG	U	619SB001S2	Ag	0.5	UG/L	UJ
3' - 5' depth	Al	2840	MG/KG	=	3' - 5' depth	Al	415	UG/L	=
	As	1.3	MG/KG	J		As	2	UG/L	U
	Ba	10.2	MG/KG	J		Ba	481	UG/L	=
	Be	0.18	MG/KG	J		Be	1	UG/L	J
	Ca	490	MG/KG	J		Ca	2330	UG/L	J
	Cd	0.02	MG/KG	UJ		Cd	0.3	UG/L	UJ
	Co	0.78	MG/KG	J		Co	0.5	UG/L	U
	Cr	4.5	MG/KG	J		Cr	3.8	UG/L	J
	Cu	1.4	MG/KG	J		Cu	2.8	UG/L	J
	Fe	2330	MG/KG	=		Fe	378	UG/L	J
	Hg	0.05	MG/KG	U		Hg	0.4	UG/L	U
	K	135	MG/KG	J		K	430	UG/L	J
	Mg	248	MG/KG	J		Mg	622	UG/L	J
	Mn	15.8	MG/KG	=		Mn	6.3	UG/L	J
	Na	96.8	MG/KG	J		Na	3370	UG/L	J
	Ni	1.7	MG/KG	J		Ni	2.5	UG/L	J
	Pb	4.9	MG/KG	=		Pb	3.1	UG/L	J
	Sb	0.18	MG/KG	UJ		Sb	5.3	UG/L	J
	Se	0.4	MG/KG	J		Se	1.7	UG/L	U
	Sn	3.2	MG/KG	J		Sn	3.2	UG/L	J
	Tl	0.18	MG/KG	R		Tl	2.4	UG/L	U
	V	6	MG/KG	=		V	3.7	UG/L	J
	Zn	6.6	MG/KG	J		Zn	31.1	UG/L	J

U	Not detected, reported value is detection limit.
UJ	Not detected, reported value is estimated detection limit.
J	Detected, reported value is an estimated concentration.
=	Detected, reported value equals detected concentration.
R	Data rejected.

Appendix D
SPLP data - AOC 619

Location **619SB004**

Sample No.		Concentration	Units	Qualifier	Sample No.		SPLP Concentration	Units	Qualifier
619SB004T1	Ag	0.05	MG/KG	U	619SB004S1	Ag	0.5	UG/L	UJ
0' - 1' depth	Al	5200	MG/KG	=	0' - 1' depth	Al	3950	UG/L	=
	As	2.3	MG/KG	J		As	5.2	UG/L	J
	Ba	16.3	MG/KG	J		Ba	306	UG/L	=
	Be	0.09	MG/KG	U		Be	0.9	UG/L	U
	Ca	30100	MG/KG	J		Ca	16000	UG/L	=
	Cd	0.03	MG/KG	J		Cd	0.3	UG/L	UJ
	Co	1.5	MG/KG	J		Co	0.5	UG/L	U
	Cr	11	MG/KG	J		Cr	9.4	UG/L	J
	Cu	11.2	MG/KG	=		Cu	15	UG/L	J
	Fe	4790	MG/KG	=		Fe	3840	UG/L	J
	Hg	0.05	MG/KG	=		Hg	0.4	UG/L	U
	K	323	MG/KG	J		K	449	UG/L	J
	Mg	915	MG/KG	J		Mg	978	UG/L	J
	Mn	83.3	MG/KG	=		Mn	28.4	UG/L	=
	Na	276	MG/KG	J		Na	1600	UG/L	J
	Ni	4.5	MG/KG	=		Ni	3.4	UG/L	J
	Pb	17	MG/KG	=		Pb	17.8	UG/L	=
	Sb	0.5	MG/KG	J		Sb	4.1	UG/L	J
	Se	0.52	MG/KG	J		Se	1.7	UG/L	U
	Sn	4.5	MG/KG	J		Sn	4.4	UG/L	J
	Tl	0.23	MG/KG	R		Tl	2.4	UG/L	U
	V	9.4	MG/KG	=		V	12.1	UG/L	J
	Zn	98.7	MG/KG	J		Zn	134	UG/L	J
619SB004T2	Ag	0.06	MG/KG	U	619SB004S2	Ag	0.5	UG/L	UJ
3' - 5' depth	Al	21700	MG/KG	=	3' - 5' depth	Al	1790	UG/L	=
	As	17.7	MG/KG	J		As	2	UG/L	U
	Ba	157	MG/KG	=		Ba	1000	UG/L	=
	Be	1.4	MG/KG	=		Be	0.9	UG/L	U
	Ca	16800	MG/KG	J		Ca	12600	UG/L	=
	Cd	0.04	MG/KG	UJ		Cd	0.3	UG/L	UJ
	Co	5.8	MG/KG	J		Co	0.5	UG/L	U
	Cr	32.1	MG/KG	J		Cr	4	UG/L	J
	Cu	28.4	MG/KG	=		Cu	4.1	UG/L	J
	Fe	26100	MG/KG	=		Fe	1590	UG/L	J
	Hg	0.62	MG/KG	=		Hg	0.4	UG/L	U
	K	2330	MG/KG	J		K	4190	UG/L	J
	Mg	3790	MG/KG	J		Mg	2440	UG/L	J
	Mn	722	MG/KG	=		Mn	9.6	UG/L	J
	Na	2100	MG/KG	=		Na	15500	UG/L	=
	Ni	11.1	MG/KG	=		Ni	2.5	UG/L	J
	Pb	106	MG/KG	=		Pb	2.2	UG/L	J
	Sb	0.6	MG/KG	J		Sb	2.4	UG/L	U
	Se	1.9	MG/KG	=		Se	1.7	UG/L	U
	Sn	5.3	MG/KG	J		Sn	2.7	UG/L	U
	Tl	1.4	MG/KG	R		Tl	2.4	UG/L	U
	V	48.4	MG/KG	=		V	6.6	UG/L	J
	Zn	255	MG/KG	J		Zn	127	UG/L	J

U	Not detected, reported value is detection limit.
UJ	Not detected, reported value is estimated detection limit.
J	Detected, reported value is an estimated concentration.
=	Detected, reported value equals detected concentration.
R	Data rejected.

Appendix D
SPLP data - AOC 619

Location	619SB015								
Sample No.		Concentration	Units	Qualifier	Sample No.		SPLP Concentration	Units	Qualifier
619SB015T1	Ag	0 05	MG/KG	U	619SB015S1	Ag	0.5	UG/L	UJ
0' - 1' depth	Al	6700	MG/KG	=	0' - 1' depth	Al	3950	UG/L	=
	As	5.3	MG/KG	J		As	5.2	UG/L	J
	Ba	23.4	MG/KG	=		Ba	306	UG/L	=
	Be	0.19	MG/KG	J		Be	0.9	UG/L	U
	Ca	38400	MG/KG	J		Ca	16000	UG/L	=
	Cd	0 15	MG/KG	J		Cd	0.3	UG/L	UJ
	Co	2.7	MG/KG	J		Co	0 5	UG/L	U
	Cr	18	MG/KG	J		Cr	9.4	UG/L	J
	Cu	45.4	MG/KG	=		Cu	15	UG/L	J
	Fe	8570	MG/KG	=		Fe	3840	UG/L	J
	Hg	0.09	MG/KG	=		Hg	0.4	UG/L	U
	K	536	MG/KG	J		K	449	UG/L	J
	Mg	1270	MG/KG	J		Mg	978	UG/L	J
	Mn	110	MG/KG	=		Mn	28.4	UG/L	=
	Na	270	MG/KG	J		Na	1600	UG/L	J
	Ni	8 3	MG/KG	=		Ni	3.4	UG/L	J
	Pb	56	MG/KG	=		Pb	17.8	UG/L	=
	Sb	0.7	MG/KG	J		Sb	4 1	UG/L	J
	Se	0.7	MG/KG	J		Se	1.7	UG/L	U
	Sn	17 2	MG/KG	=		Sn	4.4	UG/L	J
	Tl	1.3	MG/KG	R		Tl	2.4	UG/L	U
	V	14.2	MG/KG	=		V	12.1	UG/L	J
	Zn	128	MG/KG	J		Zn	134	UG/L	J
619SB015T2	Ag	0.07	MG/KG	U	619SB015S2	Ag	0.5	UG/L	UJ
3' - 5' depth	Al	18300	MG/KG	=	3' - 5' depth	Al	1790	UG/L	=
	As	10.6	MG/KG	J		As	2	UG/L	U
	Ba	30.8	MG/KG	=		Ba	1000	UG/L	=
	Be	0.67	MG/KG	=		Be	0 9	UG/L	U
	Ca	12800	MG/KG	J		Ca	12600	UG/L	=
	Cd	0.04	MG/KG	UJ		Cd	0.3	UG/L	UJ
	Co	5.4	MG/KG	J		Co	0.5	UG/L	U
	Cr	28.4	MG/KG	J		Cr	4	UG/L	J
	Cu	25.3	MG/KG	=		Cu	4.1	UG/L	J
	Fe	18900	MG/KG	=		Fe	1590	UG/L	J
	Hg	0.3	MG/KG	=		Hg	0 4	UG/L	U
	K	1460	MG/KG	J		K	4190	UG/L	J
	Mg	2620	MG/KG	J		Mg	2440	UG/L	J
	Mn	236	MG/KG	=		Mn	9.6	UG/L	J
	Na	483	MG/KG	J		Na	15500	UG/L	=
	Ni	11	MG/KG	=		Ni	2.5	UG/L	J
	Pb	39.1	MG/KG	=		Pb	2.2	UG/L	J
	Sb	0.98	MG/KG	J		Sb	2.4	UG/L	U
	Se	1.7	MG/KG	=		Se	1.7	UG/L	U
	Sn	7.1	MG/KG	J		Sn	2.7	UG/L	U
	Tl	1.6	MG/KG	R		Tl	2.4	UG/L	U
	V	39 6	MG/KG	=		V	6.6	UG/L	J
	Zn	91 1	MG/KG	J		Zn	127	UG/L	J

U	Not detected, reported value is detection limit.
UJ	Not detected, reported value is estimated detection limit.
J	Detected, reported value is an estimated concentration
=	Detected, reported value equals detected concentration.
R	Data rejected.

APPENDIX E

Responses to SCDHEC Comments

Initial Comments and Responses on the Draft Final Zone F RFI Report Specific to AOC 619
April 7, 1999

Clarifications inserted May 4, 2001

SCDHEC (Eric Cathcart) Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) NAVBASE Charleston February 26, 1999

SCDHEC Comment 1: Soil sample blanks for the following areas contained detectable contaminants: SWMU 4, AOC 619, SWMU 36, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 611, AOC 613, AOC 616, AOC 617, and Grid soil samples. Groundwater blanks contained detectable contaminants for the following areas: AOC 619, AOC 620, SWMU 109, AOC 607, AOC 609, AOC 613, GEL samples, Location 240, AOC 617, and Grid groundwater samples. These detections were noted in the volatile, semivolatile, and metals methods. In accordance with the Environmental Protection Agency, *Standard Operating Procedures* for sample collection, trace contaminants in field, trip, equipment, and distilled water blanks may indicate a problem with either decontamination procedures and/or cross contamination of samples during collection or transport. The RFI report should fully explain the existence of trace contaminants in blanks. Please revise the text to include this/these explanation(s).

EnSafe Response 1: The Project Chemist has reviewed and evaluated the data and compiled the findings in the following memo to the Project Team for review and approval.

Memorandum

To: Charleston Naval Complex Project Team

From: Charlie Vernoy, EnSafe

Subject: **Response to Comments on the Draft Zone F and K RFI Reports**

Date: March 31, 1999

Several comments by the South Carolina Department of Health and Environmental Control (SCDHEC) on the Draft Zone F and K RFI Report discuss the context of the Data Validation section and how blank contamination can be further explained

relevantly to specific site samples. This memo is intended to explain the data validation process and how it relates to blank contamination associated with the RFI report process for the Charleston Naval Complex (CNC) project and offer a resolution to stated comments. For demonstration purposes, AOC 607 in Zone F has been designated as the site to be addressed in this memo.

As part of the RFI process at CNC, chemical environmental samples undergo a third party data validation review process following USEPA Functional Guidelines. This process includes the review of analytical data generated at specific data quality objectives (DQOs) and making a determination of the validity of the results through implementation of the functional guidelines and providing professional judgement in the qualification of the data. DQOs include the collection and analysis of quality control (QC) blanks which are intended to identify possible contaminants that may be associated with the collection/analysis process.

To assess possible cross contamination from sampling procedures, deionized water, equipment, and field blanks are collected on a weekly basis per sampling event and trip blanks are submitted daily when volatile organic compounds (VOCs) are requested for analysis. The laboratory is also required to provide data on internal laboratory contamination and must analyze method blanks according to specific method requirements. The QC blanks and environmental samples are analyzed by the same methods and are routinely batched in the same Sample Delivery Group (SDG). A typical SDG includes a total of 20 samples. Batching QC and environmental samples together in the same SDG provides needed information to the data validator to make necessary decisions about the quality of the data. There are occasions when a sampling event at a particular site will have multiple SDGs and it becomes the responsibility of the data validator to incorporate the findings of QC blanks into other SDGs associated with the site.

Each SDG has its own data package incorporating the analytical results of samples and providing necessary QC data to make judgements about the validity of the data. When reviewing the data, the validator follows strict guidelines and must qualify sample data when appropriate. Contamination found in QC blank data is one aspect where qualification of data is necessary. Functional guidelines state that when contamination is found in QC blanks the validator must incorporate the findings to site samples where applicable. The way the validator applies the finding is through the "5x" or "10x" rule. The "5x" rule is taking the analytical result of the contaminant found in a QC blank and multiplying the result by five. If a compound is found in all associated blanks, then the highest result is subjected to the rule. The adjusted result is then compared to all site samples and if detections in site samples are less than the adjusted result of the blank contaminant, site sample detections are adjusted to non-detect. This rule covers all compounds except for acetone, methylene chloride, 2-butanone, and bis(2-ethylhexyl)phthalate, which are known laboratory and possible field sampling

contaminants, where the "10x" rule will apply.

Upon completion of the data review process, the validator generates a validation report which includes the functional guideline checklist with instructions on qualifying data, actual data sheets of site samples showing data qualifiers, an electronic file of the site sample data with qualifiers, and a summary report outlining deficiencies noted and data qualifiers used. EnSafe reviews the report for consistency and electronically adds the data files to a database. Once the data is validated and added to the database it becomes final and is used in writing nature and extent, fate and transport, and risk assessment sections for RFI reports. As part of the Data Validation section in the CNC RFI reports, all SDG data validation summary reports and database spreadsheets are included for review.

As part of the RFI report process, all contaminants detected in site samples that are not validated to non-detect are to be mentioned in the nature and extent section and compared to regulatory limits such as risk-based concentrations, soil screening and maximum contaminant levels. In short, if an adjusted blank contaminant detection was not higher than the site sample detection, then the site sample result is reported in the RFI report. This result would then be reviewed as a possible chemical of potential concern (COPC) or chemical of concern (COC) and identified as such where applicable. The quarterly monitoring sampling program would help to determine if a COPC or COC was from cross contamination or actual detection.

Section 4.3 in the Zone F and K Draft RFI reports summarized blank contamination found in common multiple blanks associated with a particular site (usually first round sampling events). The sections did not list contaminations found in only one blank because of the assumption that it was a single occurrence and not part of a trend. The data validation summary reports listed all blank contamination per SDG but do not point out trends between the SDGs.

In addressing comments concerning blank contamination at CNC, AOC 607 was used to demonstrate the association between field and method blank detections in all sampling events under the RFI in Zone F. Tables 1 and 2 list compounds detected and the ranges associated with the blanks. The asterisk denotes compounds that were detected in a blank but were not detected in a site sample.

Table 1 - Soil AOC 607

Field Blanks	*Range*	*Method Blanks*	*Range*
1234678-HxCDF	3.76-11.7 pg/L	1234678-HpCDD	3.67 pg/L
123478-HxCDF	0.704-2.29 pg/L	234678-HxCDF	3.15 pg/L
123678-HxCDD	2.74-7.37 pg/L	Acetone	2-12 ug/L
123678-HxCDF	1.3 pg/L	Aluminum	2.27 ug/L
123789-HxCDD	50.2-131 pg/L	Beryllium	.035-.039 ug/L

234678-HxCDF	2.74-3.5 pg/L	bis(2-Ethylhexy)lphthalate	45-53 ug/L
2-Butanone	23 ug/L	Butylbenzylphthalate	94 ug/L
Acetone	4-120 ug/L	Chloroform	1 ug/L
Acetonitrile	2800-14000 ug/L	Chromium*	.155-.202 ug/L
Aluminum	246 ug/L	Iron	4.9-6.27 ug/L
Barium	16.7 ug/L	Lead	0.296 ug/L
Benzyl Alcohol*	2 ug/L	Methylene Chloride	2-14 ug/L
Beryllium	0.31-.41 ug/L	OCDD	31 pg/L
Bromodichloromethane*	13 ug/L	Thallium	.425-4.76 ug/L
Calcium	18.7 ug/L	Tin	1.37-2.8 ug/L
Chloroform*	34 ug/L	Vanadium	0.052-.852 ug/L
Chromium	1 ug/L		
Copper	0.75 ug/L		
Cyanide	3.5 ug/L		
Iron	596 ug/L		
Magnesium	1340 ug/L		
Manganese	13.3 ug/L		
Mercury	0.11 ug/L		
Methylene Chloride	1-14 ug/L		
Napthalene	1 ug/L		
Nickel	14 ug/L		
N-Nitrosodimethylamine*	1-4 ug/L		
OCDD	388-744 pg/L		
OCDF	2.5-6.71 pg/L		
Potassium	1320 ug/L		
Sodium	6410 ug/L		
Thallium	6.8 ug/L		
Tin	2.8 ug/L		
Toluene	2 ug/L		
Vanadium	1.7 ug/L		
Zinc	7.1-10.3 ug/L		

Notes:

* Compounds not detected in any site samples.

Table 2 - Water AOC 607

Field Blanks	*Ranges*	*Method Blanks*	*Ranges*
1234678-HpCDD*	3-6 pg/L	1234789-HpCDF*	3.76 pg/L
234678-HxCDF*	3 pg/L	234678-HxCDF*	6.45 pg/L
Acetone	3 ug/l	Acetone	3-7 ug/L
Aluminum	9.3-19.6 ug/L	Aluminum	12-23.8 ug/L
Antimony	1.7-2.8 ug/L	Antimony	1.6-6.22 ug/L
Arsenic	2.2-2.5 ug/L	Arsenic	2.53-2.67 ug/L
Barium	.34-.98 ug/L	Barium	.35-2.55 ug/L

BEHP*	1-110 ug/L
Bromodichloromethan*	2 ug/L
Calcium	39.2-99.8 ug/L
Chloroform*	1-7 ug/L
Chromium	1.5 ug/L
Cobalt	1.1 ug/L
Di-n-octyl phthalate*	9 ug/L
Iron	22.4-35.9 ug/L
Magesnium	49.8 ug/L
Manganese	.38-.72 ug/L
Methylene Chloride	6-19 ug/L
Nickel	1.8 ug/L
OCDD*	9 pg/L
OCDF*	4 pg/L
Potassium	690-699 ug/L
Silver	2.3-3.8 ug/L
Sodium	33.2-24700 ug/L
Tetrachloroethene	1-14 ug/L
Zinc	7.6 ug/L

BEHP*	1-10 ug/L
Benzene*	1 ug/L
Benzoic acid	4 ug/L
Calcium	60.5 ug/L
Chloroform*	1-3 ug/L
Cobalt	1.24 ug/L
Copper	1.14-2.5 ug/L
Cyanide*	1.79-2.5 ug/L
Diethylphthalate*	1 ug/L
Heptachlor*	0.012 ug/L
Iron	20.1-32 ug/L
Lead	.91-1.4 ug/L
Magesnium	50.6-56.9 ug/L
Manganese	.5-1.2 ug/L
Methylene Chloride	2-17 ug/L
Nickel	.72-1 ug/L
OCDD*	7.35-11 pg/L
OCDF*	5.66 pg/L
Potassium	178 ug/L
Silver	1.44-1.94 ug/L
Sodium	27.5-107 ug/L
Tetrachloroethene	2 ug/L
Thallium	3.4-3.75 ug/L
Tin	19.6 ug/L
Toluene	2 ug/L
Vanadium	0.813 ug/L
Xylene*	1-2 ug/L
Zinc	7.61-10.2 ug/L

Notes:

* Compounds not detected in any site samples.

In reviewing the compounds for both lists, explanations can be made as to why certain compounds were detected. The majority of compounds that make the lists are inorganics. In comparing the method blank lists there was an increase of inorganic compounds detected in the water events as compared to the soil events. Detections generally ranged higher for the water event method blanks. The field blank lists showed virtually the same number of inorganic compounds for both soil and water events. In contrast to the method blanks, detections of common metals in the field blanks generally ranged higher for soil events. A possible reason for the high incident of metals in field blanks maybe the water from the North Charleston Water System which is used for the on-site carbon filtered/single canister deionized water system. The deionized system is routinely maintained by the Culligan company, but even working at optimal efficiency the system cannot filter out all compounds. The same can be said of the laboratories that use a carbon filtered/dual canister deionized system to filter water for the method blanks. Eliminating all metal detections from blank analyses

is an insurmountable task and efforts to identify exact sources of metals are impossible.

The organic blank detections are easier to explain in some cases. For example, the VOCs bromodichloromethane and chloroform were detected in field blanks for the soil and water events and but just chloroform was detected in the method blanks. The two VOCs are common by-products of the chlorination process of municipal water systems. As noted in the tables, bromodichloromethane and chloroform were not detected in any site samples during water sampling events.

The chlorinated dioxin and dibenzofuran detections noted in the field and method blanks are common contaminants found in a dioxin lab. Due to the extremely low detection limits (parts per quadrillion) that a dioxin lab routinely meets due to current technology, it has become extremely difficult to decontaminate glassware down to non-detect levels. However, once the 2,3,7,8-TCDD Toxicity Equivalency Factors (TEFs) are applied to the results, the overall detections are minimal.

It is possible for acetone to be detected in samples because of the decontamination procedures at CNC that use isopropyl alcohol. Acetone being a contaminant of isopropyl alcohol. But the decontamination procedures used in the field are not what laboratories follow so the acetone detections in the method blanks must be from cross contamination in the lab. Acetone is used in laboratories as a solvent for the extraction of soils.

Methylene chloride is not used in decontamination procedures but was detected in field blanks as well as in method blanks. The explanation for this is that laboratories use methylene chloride when performing water extraction for semivolatile and pesticides analyses and very likely cross contamination with CNC samples has occurred. Methylene chloride has not been identified as a COC at AOC 607.

Tetrachloroethene (PCE), also not used in decontamination procedures, was detected in the field and method blanks for the water events. AOC 607 has large PCE detections in the shallow and intermediate groundwater around building 1189 and it is very possible that cross contamination between samples as occurred. The detections for PCE do not affect the results found in the site samples.

The detections of benzene, toluene, and xylene are all below their respective method detection limits (MDLs) and cannot be verified as a true detection. The high detections of acetonitrile (an Appendix IX compound) occurred in two field blanks collected in 11/96. Both blanks were from the same SDG and no associated site samples had detections of the compound.

The phthalate compounds detected in both field and method blanks are commonly found in plastics found in disposable gloves and glassware. The phthalates that were

detected in blanks during water events were not detected in any site samples. Phthalates were detected in the method blanks during soil events and not the field blanks leading to the speculation that phthalate contamination is caused by the laboratory.

CH2M-Jones Response Clarification: *See document "Response to Reply to Comment Responses"*

SCDHEC Comment 2:
Thallium concentrations in wells 619001 and 619003 are .0034 mg/l and .0066 mg/l, respectively. The Maximum contaminant limit is .002 mg/l. The Department is aware that the Navy is performing an overall base evaluation on the occurrence of Thallium in groundwater.

EnSafe Response 2:
The final report will present and include the results of four quarters of groundwater results in the final recommendations. The results of the basewide inorganics study will be incorporated into this evaluation.

CH2M-Jones Response Clarification:
Thallium was detected within the first or second rounds only within some site wells, generally at estimated concentrations near the instrument detection limit. Thallium was not detected in subsequent sampling events. It is suspected that the reported detections are within the range of analytical instrument noise and are not actual concentrations. Because they are not reproducible and do not represent a contaminant, they are not considered COCs at this site.

SCDHEC (Johnny Tapia) Comments on The Zone F Draft RCRA Facility Investigation Report (dated 31 December 1998) NAVBASE Charleston March 12, 1999

SCDHEC Comment 2:
Section 4.3. "Data Validation Reports" is an enumeration of the results and detections of blank samples in soil and groundwater. These results should be interpreted in a relevant and meaningful manner by describing if the blank detection means the contaminant is present in the sample, is a product of cross-contamination, etc. This would clarify the significance of the presence of certain contaminants in the samples collected at each unit. As written, contributes minimum value for the review of the document. Please revise this section.

EnSafe Response 2:
The Project Chemist will review and evaluate the data and compile the findings into a memo for the Project Team's review and approval. Please see response to E. Cathcart Comment #1.

CH2M-Jones Response Clarification: *No further clarification needed.*

SCDHEC Comment 3:
Table 6.4 which calculates the Soil Screening Levels for the protection of groundwater needs to revise and recalculate the values for Thallium and Benzo(a)pyrene. The MCL values for the Target Leachate Concentration are not correct, therefore the calculated SSL values need to be verified. Please correct and consider implications throughout the report.

EnSafe Response 3:
The MCL value for benzo(a)pyrene in Table 6.4, used as the unadjusted target leachate concentration, is shown incorrectly as 0.002 mg/L; it should be 0.0002 mg/L, and will be corrected in the final report. The unadjusted target leachate concentration of 0.0005 mg/L shown for thallium is actually the MCLG rather than thallium's MCL of 0.002 (see column heading in table), and is therefore more conservative (lower) than the MCL. The *Soil Screening Guidance: User's Guide* specifies the use of a nonzero MCLG, MCL, or HBL (Equation 10, p. 29) to determine the target soil leachate concentration. In any event, neither of the calculated SSLs from Table 6.4 was used in the Section 10 screening tables. Because benzo(a)pyrene has an EPA-calculated SSL of 8 mg/kg (*Soil Screening Guidance: Technical Background Document*, Appendix A), that value was used in the tables. The EPA-calculated

value of 0.7 mg/kg for thallium would have been used in the screening tables, except that thallium's background reference value of 1.24 mg/kg for subsurface soil was higher, and was therefore used instead. Sometime after the draft RFI report for Zone F was submitted, SCDHEC requested that background reference values for inorganics not be used in place of corresponding SSLs in the fate and transport screening tables when they exceed the SSLs. Consequently, 0.7 mg/kg will be used as the SSL for thallium in the final RFI report.

CH2M-Jones Response Clarification: *SSLs for both Thallium and Benzo(a)pyrene are taken from the EPA Region III RBC charts, October, 2000 and adjusted for the site-specific DAF. SSLs for most other detected inorganics are derived from site-specific SPLP evaluations, using the MCL CH2M-Jones does not agree that background values that exceed SSL values should not be considered in the assessment of COCs. Therefore, for thallium, if background data indicate that background values exceed the SSL, these background data will also be used as screening levels in assessing whether a chemical may be a COC.*

SCDHEC Comment 4:
The second paragraph of page 6.16 needs to be revised for the statements made about the use of the highest of background values (upper or lower soil) used as the screening alternative to SSLs. The same approach is mentioned for groundwater where the greater of shallow or deep background concentrations is used as an screening alternative to the tap water RBCs. Using this approach defeats the purpose of collecting two set of samples (upper and lower) to determine background reference concentrations and is not a conservative screening process. In addition, the same paragraph states that this approach is proposed based only on assumptions. The Screening process should continue as previously approved. Please revise this paragraph and consider implications throughout the report.

EnSafe Response 4:
Contaminant transport from soil to groundwater involves infiltration of rainwater into the soil followed by percolation downward through surface soil and subsurface soil (the vadose, or unsaturated zone), through the water table into the saturated zone (the unconfined aquifer). Each molecule of water is exposed to contaminants in both surface and subsurface soil as it moves downward to the aquifer. Because the migrating soil water is also exposed to background concentrations of soil constituents at each level, the only relevant background concentration for making comparisons to contaminant concentrations is the greater of the surface soil or subsurface soil values. Collecting background soil samples at both depths is necessary because most human health risk assessment applications require comparisons to background for surface soil only. Because of SCDHEC's request (see Response 3 above) that background values not be used in place of SSLs, however, this is a moot point.

As stated in the paragraph in question on page 6.16, the lithology of the surficial aquifer in Zone F is complex. Given the uncertainty about the interconnectedness of the portions of the aquifer encountered in each well, groundwater results from

each depth (shallow or deep) will be screened only against background reference values from the corresponding depth for the final report.

CH2M-Jones Response Clarification: *See document "Response to Reply to Comment Responses" for revised Ensafe response.*

SCDHEC Comment 5:
Please clarify in the text that according to EPA's latest guidance on dioxins the 1,000 ng/Kg (as 2,3,7,8-TCDD TEQs) is based on a residential cleanup level with a risk level of 1E-4. Please clarify also that this cleanup level is being used as a screening number due to the complex and time-consuming calculations involved with risk presented by dioxins. For instance page 7.7 needs this clarification. Please correct accordingly.

EnSafe Response 5:
The above clarifications will be made in the revised report with one exception. The 1,000 ng/kg PRG for 2,3,7,8-TCDD TEQs is based on an *industrial* scenario and a target risk of 1E-04.

CH2M-Jones Response Clarification: *Dioxin detections in soil duplicate samples from AOC 619 were at least 3 orders of magnitude lower than the 1,000 ng/kg TEQ PRG quoted, and therefore were not considered of concern at the site.*

SCDHEC Comment 6:
Page 7.10, "Summary of COPCs" paragraph makes the statement that "If no groundwater impacts were identified, the current soil concentrations were considered sufficiently protective of the underlying aquifer". The Department does not necessarily agree with this statement. Other factors as age of the unit, age of spills, type of contaminants present, barriers present (asphalt, concrete, etc.) would influence the presence of contaminants in groundwater. Please modify this statement and consider this factor when making this statement in reference to a specific unit.

EnSafe Response 6:
The factors mentioned above will be considered when evaluating soil's potential impact to the groundwater.

CH2M-Jones Response Clarification: *See document "Response to Reply to Comment Responses" for revised Ensafe response.*

SCDHEC Comment 7:
It may be appropriate to determine a background reference concentration, at Zone F soil and groundwater, for chemicals considered essential nutrients specially for iron. This natural nutrient has been detected at higher concentrations than usual throughout

this zone and may be of concern. An evaluation can not be properly done at this time without having an appropriate background concentration and it has been dismissed many times without further consideration. This should be corrected in the final RFI report.

EnSafe Response 7: Printouts of iron detections in both soil and groundwater exhibit smooth distributions with one high anomalous concentration in each case. Iron in soil samples appears to correlate closely with aluminum, indicating that high concentrations of both metals are related to high percentages of clay in the sample. Scatterplots of iron vs. aluminum would help confirm this interpretation, and would also make it possible to identify individual samples with genuinely anomalous high iron concentrations.

Agreed, a background concentration should be developed for iron. Since iron is an essential nutrient, there is no clear guidance for iron risk assessment for human health and therefore no clear risk based remedial alternatives to the background concentration. For sites with iron reported at concentrations above the background reference concentration it is highly recommended that the Project Team develop a framework for managing such sites. However, it will be necessary to do so with a minimum of risk based decision making tools.

CH2M-Jones Response Clarification: *Background concentrations for iron are identified from grid samples from combined Zones F and G. The following concentrations will be used for screening:*

Iron in Grid Samples – Zones F and G combined					
Media	*No. of Samples*	*Units*	*Min Detect*	*Max Detect*	*2 x Mean*
Shallow Groundwater	*21*	*ug/L*	*2000*	*62,300*	*48,370*
Deep Groundwater	*20*	*ug/L*	*38*	*18,300*	*12,679*
Surface Soil	*15*	*Mg/Kg*	*3570*	*32,700*	*26,896*
Subsurface Soil	*13*	*Mg/Kg*	*3110*	*58,100*	*31,289*

SCDHEC Comment 8:
This comment is applicable to all units in Zone F. The Risk uncertainty section generally summarizes all detections and explain contributing or mitigating factors to be considered when reaching a decision on the fate of the unit. Since groundwater contamination is assessed based mainly on the first quarter of groundwater sampling, mitigating or contributing factors, such as results of subsequent rounds of groundwater sampling that confirm or refute possible contamination, should be acknowledged. Also, new contaminants detected should be mentioned. Please review the report.

EnSafe Response 8:
The Navy agrees and will evaluate all available data for incorporation into the final report.

SCDHEC Comment 9:
The SSL values used in table 10.1.3 for the comparison to lower soil samples detections, need to be revised for the implications that comment #3 may have, and also other values that do not seem to agree with the SSLs calculated on table 6.4. Please revise.

EnSafe Response 9:
The Navy concurs and will make the necessary changes.

SCDHEC Comment 10:
There are two defined areas where subsurface samples were not collected. These areas are: One encompassing soil samples 619SB0011 and 619SB008. The other area encompasses soil borings 5, 6, 2, and 7 for AOC 619. Nearby detections of contaminants suggest that the extent has not been defined for VOCs, metals and SVOCs. Detections of VOCs and BEQs seem to coincide. The extent of this contamination should be defined.

EnSafe Response 10:
Subsurface soil samples were not collected from these locations due to a shallow watertable. A comparison of the elevated soil constitents (benzo(a)pyrene, benzene and chromium) to analytes detected in shallow groundwater from nearby monitoring wells illustrates that these analytes have not impacted groundwater quality. Based on these results, the Navy feels it would not be necessary to collect these saturated samples.

CH2M-Jones Response Clarification: *See document "Response to Reply to Comment Responses" for revised Ensafe response.*

Note: Zone F Draft RFI Report comments by Susan Byrd/SCDHEC and responses are presented in document "Response to Reply to Comment Responses"